

# **ACTIVE AND RESTORATIVE CAMPUS:**

**Designing A Garden Street For Student's Mental And Physical Well-Being**

by

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A REPORT

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# ABSTRACT

A significant decline of mental and physical health exists within college students today (ACHA, 2014; Gallagher, 2006). Recently, to promote mental health, restorative landscapes have emerged as a trend in healthcare environments by formalizing the healing properties of nature within a designed environment. Humans have been shown to undergo a measurable relief of stress, improved attention, and an improved overall sense of well-being when exposed to a restorative landscape setting. Opportunities exist for university campuses to more advantageously employ the mental health benefits of restorative landscapes. Furthermore, to address physical health, the university campus holds unique opportunities to increase students' physical activity through promotion of active lifestyles using active modes of transportation.

Campus streets, based on their lack of affordances to promote mental and physical health as well as their inherent connectivity to key campus buildings and spaces are investigated as a site for a designed solution. A recent trend of campus street conversions to pedestrian malls is identified and explored as a tool to facilitate creation of a restorative and active campus.

The project, based in two fundamental research questions, investigates how campus street design can improve the collective mental health of college students, and how campus street design can promote physical health. Literature review analysis reveals theories and principles of restorative landscape and campus design. The project unites these findings with case study

analysis to form a framework to facilitate the design of restorative environments within a university campus. Pragmatic evidence of built environment interventions has been synthesized from literature review and case study analysis into an additional framework to increase physical activity through active transportation.

Kansas State University's campus has been identified as a suitable case for a design proposal. Planning and design decisions at three nested scales are made to illustrate how the frameworks may be applied to reclaim a campus street as an active and restorative "garden street." In the context of declining mental and physical health among college students, the synthesis of principles related to restorative landscape design and active transportation presents a valuable structure to mitigate declining mental and physical health of students.

# TABLE OF CONTENTS

<b>01</b>	<b>INTRODUCTION</b>	<b>02</b>
<b>02</b>	<b>LITERATURE AND CASE STUDY ANALYSIS</b>	<b>16</b>
<b>03</b>	<b>METHODOLOGY</b>	<b>104</b>
<b>04</b>	<b>SYNTHESIS</b>	<b>114</b>
<b>05</b>	<b>INVESTIGATION</b>	<b>138</b>
<b>06</b>	<b>DESIGN APPLICATION</b>	<b>184</b>
<b>07</b>	<b>CONCLUSION</b>	<b>302</b>
<b>08</b>	<b>APPENDICES</b>	<b>336</b>

# LIST OF FIGURES

<b>Figure 1.1</b>	Conceptual Project Diagram	3
<b>Figure 1.2</b>	Conceptual Built Environment Relationship To Health	6
<b>Figure 1.3</b>	Moderator Relationship Between Mental And Physical Health	7
<b>Figure 1.4</b>	Project Structure And Outcomes	11
<b>Figure 1.5</b>	Overall Project Path	12
<b>Figure 1.6</b>	Illustrative Project Schedule Diagram	13
<b>Figure 1.7</b>	Monumental Pedestrian Boulevard Within The Campus Of Nanjing University	14
<b>Figure 2.1</b>	Literature Map	19
<b>Figure 2.2</b>	UTD Campus Mall	22
<b>Figure 2.3</b>	Campus Life	27
<b>Figure 2.4</b>	Light Walk in October	30
<b>Figure 2.5</b>	Student Walk At FIU	38
<b>Figure 2.6</b>	Ecological Model Of Neighborhood Environment Influence On Walking And Cycling	40
<b>Figure 2.7</b>	Expressive Approach To Meditative Garden at Skogskyrkogården	48
<b>Figure 2.8</b>	Trail At Konza Prairie Provides Public Access To Nature	50
<b>Figure 2.9</b>	Exposure To Nature Provides Restoration	61
<b>Figure 2.10</b>	The University of St. Thomas Student Life Mall	62
<b>Figure 2.11</b>	Paving Pattern Demarcates Space	65
<b>Figure 2.12</b>	Bike Racks Increase Accessibility	65
<b>Figure 2.13</b>	Site Plan Illustrates Project Clarity	65
<b>Figure 2.14</b>	Pedestrian Spine Bustling With Human Scale Activity	65
<b>Figure 2.15</b>	Wide Pedestrian Paths Reunite Campus Core	67
<b>Figure 2.16</b>	Semi-Enclosed Seating Creates Intimacy	67
<b>Figure 2.17</b>	Obscurity Before Design Intervention	67
<b>Figure 2.18</b>	Pedestrian Spine Reinforces Spatial Clarity	67
<b>Figure 2.19</b>	Art Creates Focal Point Within Pedestrian Plaza	69
<b>Figure 2.20</b>	Walls Create Informal Seating Opportunities	69
<b>Figure 2.21</b>	Intimate Seating Area Adjacent To Mall	69
<b>Figure 2.22</b>	The Pedestrian Mall Links Many Buildings Within The Campus Core	69
<b>Figure 2.23</b>	Intimate Subspaces Provide Opportunities For Socializing	71
<b>Figure 2.24</b>	Several Fountains Animate The Space	71
<b>Figure 2.25</b>	Benches Set Back On Path Allow Surveillance	71
<b>Figure 2.26</b>	Spaces Allow Gathering Adjacent To Pedestrian Mall	71
<b>Figure 2.27</b>	Bicycle Parking At UC Davis	74
<b>Figure 2.28</b>	Dedicated Bicycle Circles Allow Easy Interchange	77
<b>Figure 2.29</b>	Mid-Block Crossings Simplify Bicycle Travel	77
<b>Figure 2.30</b>	Ample Bicycle Parking Promotes System Use	77
<b>Figure 2.31</b>	Separated Bicycle Paths Minimize Conflicts Between Travel Modes	77
<b>Figure 2.32</b>	Embedded GPS Systems Allow Geospatial Mapping	79
<b>Figure 2.33</b>	Bicycles Are Simple And Functional	79
<b>Figure 2.34</b>	Web Based Reservation Adds Convenience	79
<b>Figure 2.35</b>	18 Bicycle Hubs Act As Primary Docking Stations For The Bicycles	79
<b>Figure 2.36</b>	Bicycling Infrastructure Improvement Recommendations	81
<b>Figure 2.37</b>	Healing Garden at Celebration Health	82
<b>Figure 2.38</b>	Site Plan Illustrates Spatial Richness	85
<b>Figure 2.39</b>	Fountain Creates Pleasant White Noise	85

<b>Figure 2.40</b>	Contemplation Garden Allows Users To Find Reflective Solitude	85
<b>Figure 2.41</b>	Sinuous Path Winds Through A Native Meadow Space	87
<b>Figure 2.42</b>	Tactile, Sculptural Art Avoids Abstraction	87
<b>Figure 2.43</b>	Protected, Moveable Seating Provides Prospect & Refuge	87
<b>Figure 2.44</b>	A Labyrinth Has Been Designed With Sacred Geometry In Mind To Enhance Healing	87
<b>Figure 2.45</b>	Site Plan Emphasizes Garden Circulation	89
<b>Figure 2.46</b>	Protected Seating Nooks Allow Conversation	89
<b>Figure 2.47</b>	Circulation Hierarchy Reinforced By Material Choice	89
<b>Figure 2.48</b>	A Patient “Walks” The Garden From His Room’s Window	91
<b>Figure 2.49</b>	Walls + Vegetation Provide Spatial Enclosure	91
<b>Figure 2.50</b>	Sculptures Along Path Draw Users Through The Space	91
<b>Figure 2.51</b>	Chapter Summary	102
<b>Figure 3.1</b>	Project Methodology	107
<b>Figure 3.2</b>	Project Thesis	108
<b>Figure 4.1</b>	Nested Scale of Design	118
<b>Figure 4.2</b>	Framework Relationships Across Scales	119
<b>Figure 4.3</b>	Active Transportation Framework	120
<b>Figure 4.4</b>	Restorative Landscape Framework	122
<b>Figure 4.5</b>	Restorative Landscape Literature Synthesis	124
<b>Figure 4.6</b>	Concept Sketches Of Spatial Archetypes	127
<b>Figure 4.7</b>	Braid Archetype	128
<b>Figure 4.8</b>	Valley Archetype	129
<b>Figure 4.9</b>	Bluff Archetype	130
<b>Figure 4.10</b>	Grove Archetype	131
<b>Figure 4.11</b>	Fringe Archetype	132
<b>Figure 4.12</b>	Channel Archetype	133
<b>Figure 4.13</b>	Field Archetype	134
<b>Figure 4.14</b>	Peak Archetype	135
<b>Figure 4.15</b>	Stage Archetype	136
<b>Figure 4.16</b>	Lowland Archetype	137
<b>Figure 5.1</b>	Site Location	140
<b>Figure 5.2</b>	Campus Development From 1863-1899	144
<b>Figure 5.3</b>	Campus Development From 1900-1939	144
<b>Figure 5.4</b>	Campus Development From 1940-1979	145
<b>Figure 5.5</b>	Campus Development From 1980-2015	145
<b>Figure 5.6</b>	Current Pedestrian Only Zone Within The Kansas State University Campus	149
<b>Figure 5.7</b>	Pedestrian Only Zone Within Kansas State University’s Campus After Street Closure	149
<b>Figure 5.8</b>	Kansas State University Campus Relationships	150
<b>Figure 5.9</b>	Kansas State University Vehicular Infrastructure	151
<b>Figure 5.10</b>	Campus And Immediate Context Zoning	151
<b>Figure 5.11</b>	Elevation Map of Kansas State University	152
<b>Figure 5.12</b>	Slope Map of Kansas State University	152
<b>Figure 5.13</b>	Most Frequently Visited Buildings On Campus	153
<b>Figure 5.14</b>	Kansas State University Bicycle Infrastructure	154
<b>Figure 5.15</b>	Kansas State University Pedestrian Infrastructure	155

<b>Figure 5.16</b>	Core Campus Boundary	156
<b>Figure 5.17</b>	Core Campus Gateways	157
<b>Figure 5.18</b>	Pedestrian Circulation Hierarchy	157
<b>Figure 5.19</b>	Core Campus Green Space	158
<b>Figure 5.20</b>	Core Campus Streets & Parking	158
<b>Figure 5.21</b>	Pedestrian/Vehicle Crash Frequency	159
<b>Figure 5.22</b>	Bicyclist/Vehicle Crash Frequency	160
<b>Figure 5.23</b>	Stress And Anxiety Inducing Outdoor Spaces	161
<b>Figure 5.24</b>	Least Used Campus Streets	162
<b>Figure 5.25</b>	Site Analysis Synthesis	163
<b>Figure 5.26</b>	Corridor Scale Analysis/Design Limits	164
<b>Figure 5.27</b>	Corridor Scale Topographic Relief	165
<b>Figure 5.28</b>	Corridor Scale Pedestrian Network	166
<b>Figure 5.29</b>	Corridor Scale Bicycle Network	167
<b>Figure 5.30</b>	Corridor Scale Vehicular Network	168
<b>Figure 5.31</b>	Corridor Restoration Potential	169
<b>Figure 5.32</b>	Corridor Photography Key Map	170
<b>Figure 5.33</b>	Intersection Alignment Causes Confusion	171
<b>Figure 5.34</b>	Long Crossing Distances Deter Walking	171
<b>Figure 5.35</b>	Gathering Space Allows Socialization	171
<b>Figure 5.36</b>	Parking Lot Is An Eyesore To Passersby	172
<b>Figure 5.37</b>	Corridor Dominated By Vehicular Access	172
<b>Figure 5.38</b>	Wall Acts As Barrier To Willard Hall	172
<b>Figure 5.39</b>	Arts Terrace Lacks Functionality	173
<b>Figure 5.40</b>	Infrastructure Interrupts Views To Quad	173
<b>Figure 5.41</b>	Bicycles Share Street Space With Vehicles	173
<b>Figure 5.42</b>	Street Dominates Pedestrian Experience	174
<b>Figure 5.43</b>	Amphitheater Allows Outdoor Classes	174
<b>Figure 5.44</b>	No Separation Between Street & Sidewalk	174
<b>Figure 5.45</b>	Cut Banks Within Degraded Campus Creek	175
<b>Figure 5.46</b>	Vast Parking Lot Limits Restoration	175
<b>Figure 5.47</b>	Unprogrammed Space Limits Creek Access	175
<b>Figure 5.48</b>	Intersection Creates Chaotic Experience	176
<b>Figure 5.49</b>	Lack Of Easy Access To Natural Amenities	176
<b>Figure 5.50</b>	Pedestrians Displaced to Street Edges	176
<b>Figure 5.51</b>	Outdoor Dining/Seating Spaces Are Limited	177
<b>Figure 5.52</b>	Opportunity To Create Active “Hub”	177
<b>Figure 5.53</b>	Library Has Trivial Contextual Relationship	177
<b>Figure 5.54</b>	Building Functions and Entrances	178
<b>Figure 5.55</b>	Primary Opportunities and Constraints	179
<b>Figure 5.56</b>	Chilled Water Plan	180
<b>Figure 5.57</b>	Mid-Campus Drive Design Proposal	181
<b>Figure 5.58</b>	Design Details	181
<b>Figure 6.1</b>	Design Process	187
<b>Figure 6.2</b>	Conceptual Campus Wide Plan	188
<b>Figure 6.3</b>	Campus Scale Design	190

<b>Figure 6.4</b>	Parking Removal & Consolidation	192
<b>Figure 6.5</b>	Building Infill Creates Higher Density	194
<b>Figure 6.6</b>	Street Closures & Re-Alignments	196
<b>Figure 6.7</b>	Proposed Bicycle Infrastructure	198
<b>Figure 6.8</b>	Existing Lack of Restorative & Active Affordances	200
<b>Figure 6.9</b>	Proposed Separated Bicycle Lane And Riparian Corridor Improvements	200
<b>Figure 6.10</b>	Street Diet And Related Pedestrian Improvements	202
<b>Figure 6.11</b>	Current Site Conditions At Claflin Road	204
<b>Figure 6.12</b>	Proposed Street Diet	204
<b>Figure 6.13</b>	Potential Bicycle Share Hub Locations	206
<b>Figure 6.14</b>	Multi-Modal Transit System	208
<b>Figure 6.15</b>	Corridor Scale Design Boundary	210
<b>Figure 6.16</b>	Corridor Scale Design	212
<b>Figure 6.17</b>	Corridor Scale Design Assumptions	214
<b>Figure 6.18</b>	Social Opportunity Nodes & Spatial Diversity	216
<b>Figure 6.19</b>	Key Contextual & Access Relationships	218
<b>Figure 6.20</b>	Corridor Building Height	220
<b>Figure 6.21</b>	Emergency Access Considerations	220
<b>Figure 6.22</b>	Circulation Definition & Rationale	222
<b>Figure 6.23</b>	Spatial Programming And Activities	224
<b>Figure 6.24</b>	Restorative Spatial Archetypes	226
<b>Figure 6.25</b>	Application Of Restorative Spatial Archetypes	226
<b>Figure 6.26</b>	Archetypal Restorative Outcome Levels	228
<b>Figure 6.27</b>	Corridor Gateways And Landmarks	230
<b>Figure 6.28</b>	Corridor Active Transportation Considerations	232
<b>Figure 6.29</b>	Site Scale Design	234
<b>Figure 6.30</b>	Site Scale Plan	236
<b>Figure 6.31</b>	Spatial Hierarchy	238
<b>Figure 6.32</b>	Site Circulation	238
<b>Figure 6.33</b>	Site Views & Experience	240
<b>Figure 6.34</b>	Degrees Of Enclosure	240
<b>Figure 6.35</b>	Restorative Water Features	242
<b>Figure 6.36</b>	Vegetation	242
<b>Figure 6.37</b>	Social Vs. Introspective Level	244
<b>Figure 6.38</b>	Sensory Stimulation	244
<b>Figure 6.39</b>	Site Scale Spaces	246
<b>Figure 6.40</b>	Spatial Archetype 1	248
<b>Figure 6.41</b>	Key Plan 1	248
<b>Figure 6.42</b>	Site Section AA	250
<b>Figure 6.43</b>	Illustrative Plan 1	250
<b>Figure 6.44</b>	Garden Street Decompression/Gateway Court	252
<b>Figure 6.45</b>	Spatial Archetype 2	254
<b>Figure 6.46</b>	Key Plan 2	254
<b>Figure 6.47</b>	Site Section BB	256
<b>Figure 6.48</b>	Illustrative Plan 2	256
<b>Figure 6.49</b>	Spatial Archetype 3	258

<b>Figure 6.50</b>	Key Plan 3	258
<b>Figure 6.51</b>	Site Section CC	260
<b>Figure 6.52</b>	Illustrative Plan 3	260
<b>Figure 6.53</b>	Dense Grove Shapes A Serene, Contemplative Atmosphere	262
<b>Figure 6.54</b>	Spatial Archetype 4	264
<b>Figure 6.55</b>	Key Plan 4	264
<b>Figure 6.56</b>	Site Section DD	266
<b>Figure 6.57</b>	Illustrative Plan 4	266
<b>Figure 6.58</b>	Spatial Archetype 5	268
<b>Figure 6.59</b>	Key Plan 5	268
<b>Figure 6.60</b>	Site Section EE	270
<b>Figure 6.61</b>	Illustrative Plan 5	270
<b>Figure 6.62</b>	Spatial Archetype 6	272
<b>Figure 6.63</b>	Key Plan 6	272
<b>Figure 6.64</b>	Site Section FF	274
<b>Figure 6.65</b>	Illustrative Plan 6	274
<b>Figure 6.66</b>	Entry Experience Into Garden Street From Transit Stop	276
<b>Figure 6.67</b>	Spatial Archetype 7	278
<b>Figure 6.68</b>	Key Plan 7	278
<b>Figure 6.69</b>	Site Section GG	280
<b>Figure 6.70</b>	Illustrative Plan 7	280
<b>Figure 6.71</b>	Spatial Archetype 8	282
<b>Figure 6.72</b>	Key Plan 8	282
<b>Figure 6.73</b>	Site Section HH	284
<b>Figure 6.74</b>	Illustrative Plan 8	284
<b>Figure 6.75</b>	Spatial Archetype 9	286
<b>Figure 6.76</b>	Key Plan 9	286
<b>Figure 6.77</b>	Site Section II	288
<b>Figure 6.78</b>	Illustrative Plan 9	288
<b>Figure 6.79</b>	Bicyclists Ride Past Naturalized Creek And Trails	290
<b>Figure 6.80</b>	Spatial Archetype 10	292
<b>Figure 6.81</b>	Key Plan 10	292
<b>Figure 6.82</b>	Site Section JJ	294
<b>Figure 6.83</b>	Illustrative Plan 10	294
<b>Figure 6.84</b>	Outdoor Recreation Space Sheltered By Landform	296
<b>Figure 6.85</b>	Spatial Character Along The Mid-Campus Garden Street	299
<b>Figure 6.86</b>	Mental & Physical Health Promotion	301
<b>Figure 7.1</b>	Active Restoration	312

# LIST OF TABLES

Table 2.1	Landscape Preference Matrix	61
Table 2.2	Campus Street Closure Case Study Program Elements And Design Considerations	79
Table 2.3	Themes Related To Specific Program Elements & Design Considerations	79
Table 2.4	Restorative Landscape Cases & Associated Awards	89
Table 2.5	Relationship Between Program Elements And Literature Themes	106
Table 2.6	Restorative Case Study Program Elements And Design Considerations	107



# PERSONAL MOTIVATION

Ever since I was a small child, nothing excited me more than spending time exploring nature by walking through the woods, building tree forts outside, and fishing with family and friends. I've always been fascinated with the power of nature to make me feel whole and reduce my own stress and anxiety. I spent many weeknights and weekends as a child and teenager getting in touch with my love for the outdoors without formally realizing the benefits that this time spent in nature had on my mental and physical health. Annual family trips to the San Juan Mountains of Colorado always seemed therapeutic to me, but it wasn't until I began background research for this project and report that I recognized the real benefits that this time spent away from the hustle and bustle of everyday city life.

During my time at Kansas State over the past five years, I've spent a fair amount of time discovering places to escape to in order to remove myself from the stresses of studio by refreshing my mind through exposure to nature. While the campus environment at Kansas State University is certainly picturesque, I wasn't able to identify any specific places within the campus to visit in order to relax and refocus my thoughts.

In the spring of 2013, I participated in a tour of the recently constructed healing garden at Mercy Regional Health Center given by Thomas Hittle, the landscape architect responsible for the design of this space. The garden is intended to provide healing and stress relief for the patients and visitors of the hospital through exposure to nature within the hospital courtyard.

This got the initial gears turning in my head as I began to wonder how spaces within the university campus could be redesigned to provide similar healing and stress relief for students. Would it be at all possible to apply some of the principles of restorative/healing landscape design to the campus environment?

My interest in the physical health dimension of this project was initially sparked by a two week study tour to several Scandinavian countries during the summer of 2013. The trip was established to investigate sustainable design and urban planning in the Scandinavian context. The immersion within well designed bicycle networks during this two week study tour and subsequent semester long study abroad experience in Denmark had a major impact on my understanding of how design can influence behavior. Through coursework and meetings with researchers and professionals in Copenhagen, Malmö, and Stockholm I was introduced to the power of active transportation to improve public health by promoting physical activity. How then, I wondered, could active transportation be better promoted and accepted as a legitimate mode of travel within the university campus context?

These two ideas related to mental and physical health did not formally collide and merge into the foundation of this project until a meeting with my major professor, Hyung Jin Kim in January of 2015. Our discussions about the moderating effects of mental and physical health upon one another further grounded this project, and further research and design exploration ensued.

# ACKNOWLEDGEMENTS

While this project and report bear my name and serve as partial fulfillment of the requirements for the degree of Master of Landscape Architecture, I couldn't have accomplished this work without the hard work and dedication of those around me.

First and foremost I would like to extend thanks to my mother and father for all of the support that they've given me throughout my time at college. Without the guidance and encouragement from the two of you, none of this wild adventure would have been possible. I thank you wholeheartedly for providing opportunities to help me to find and develop my passion for design through my studies at Kansas State University.

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evolution of this project and growth of myself as a researcher and critical thinker. My secondary and tertiary committee members Jason Brody and Alpa Nawre have been instrumental as committee members in the initiation and development of this project. Their counseling and advice has helped mold not only this project, but also my vision for the sort of professional I hope to one day become.

My close studio classmates Glen, Nick, and Katie have provided continuing assistance and helped me push this project forward. To all of my close friends at Kansas State, there are too many of you that have profoundly impacted this project in a positive way for me to call each and every one of you out personally, but I would like to extend my appreciation to each and every one of you.

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Thank you also to all of the design firms and photographers who contributed such inspiring and thought provoking work to this project. Your images have helped to illustrate the power that the medium of the landscape holds to create environments that positively influence human health and well-being.

01

# INTRODUCTION

The introduction section of this report presents general information related to the initiation of the project, framing of the project, and subsequent development. The chapter is structured around the identification of a dilemma, the development of research goals and objectives that respond to this dilemma, and a brief discussion of the relevance of this project to the greater field of landscape architecture looking to the future. Project intent outlines the general expectations of the author for the project.

# PROJECT BACKGROUND

University campuses have the potential to be of the most unique, memorable, and meaningful landscapes that young adults interact with in their development and maturation as students. The campus as a physical setting can act as a manifestation of the university's mission and values while providing an inherent structure to support a wide range of activities ranging from daily circulation to festivals, concerts, protests, outdoor classrooms, socialization, and recreational activities among other planned and spontaneous events.

In many cases, the spatial integrity and human scale of many university campuses has been sacrificed to make way institutional progress in the form of evolving architectural, infrastructural, and administrative demands. The middle of the 20th century in particular saw universities nationwide responding to growing demands of their constituents for increased access via automobile. This automobile centered planning and design resulted in the creation of infrastructural spaces which are scaled to the needs of the vehicle rather than the pedestrian. The streets, parking lots, and intersections required to support automobiles within the campus core oftentimes infringe upon the continuity of the pedestrian experience on campus.

Rather than acting simply as an infrastructural and architectural depository, this project explores strategies to embed richer, more meaningful, and healthier experiences both mentally and physically within the campus landscape. Other than providing opportunities to structure the

circulation and organization of building masses, the university campus, like any built environment holds the unique potential to positively impact the mental and physical health of all those who interact with it.

By identifying the driving principles that inform design of university campus landscapes, restorative landscapes, and active transportation networks; a singular hybridized design can be created. This project seeks to craft design guidelines that facilitate the creation of a restorative and active campus through methodical inquiry, research, synthesis, and ultimately design application. These guidelines are then applied to the Kansas State University campus, which acts as a typical case of a 21st century university campus. The final product, based mainly in literature review, but also applying findings from site analysis and survey results, illustrates how a university campus can retrofit a street and the surrounding campus context to promote physical and mental health among the student body.

# CONCEPTUAL DIAGRAM

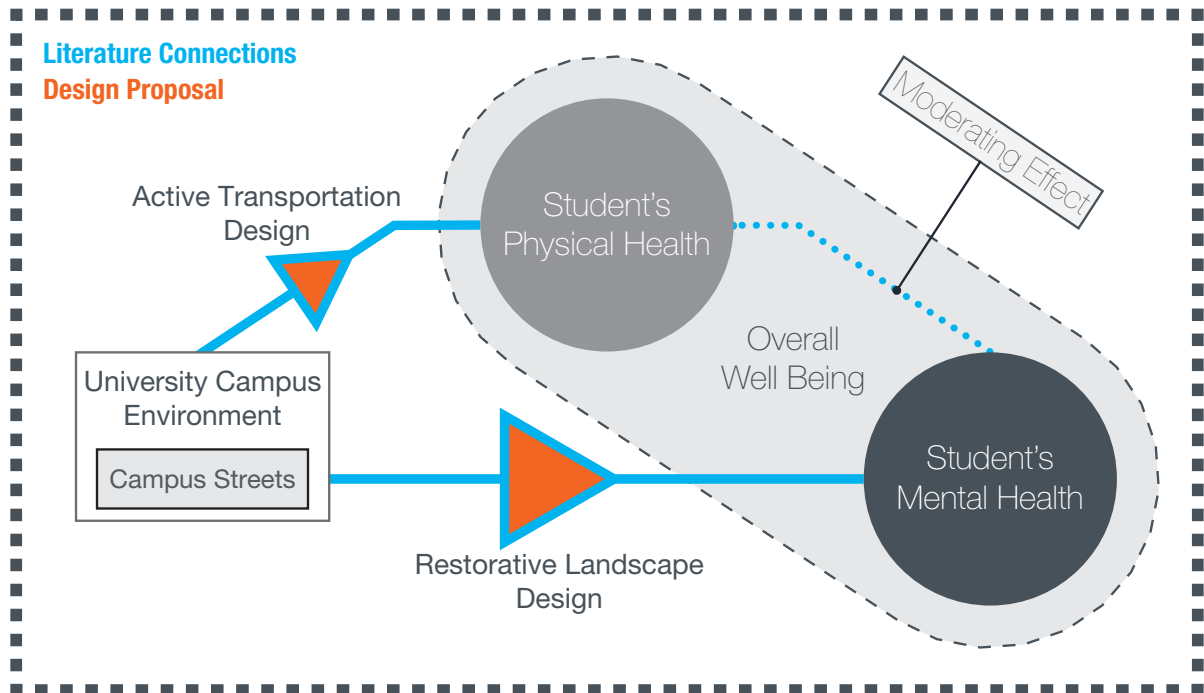


Figure 1.1 Conceptual Project Diagram | By Author

Figure 1.1 above illustrates the conceptual connections between topical subject matter within this project. Comprehensive literature connections act as the glue to bind these seemingly unrelated topics. The overall campus scale environment is explored through active transportation design in order to promote student's physical health. Streets within the university campus environment are then explored through the lens of restorative landscape design with the intention of increasing students' mental health. As mentioned previously,

due to the underlying differences in scale of the nature of responses to restorative landscapes and active transportation considerations, design solutions for each are addressed separately and then united based on relationships identified by the moderator. The moderator effect describes the significant correlation between physical and mental health and ties a conceptual knot between the two design approaches to connect the research and design methodology. This model lastly demarcates the conceptual project boundary.

# DILEMMA

There is a growing crisis both visible and hidden on the university campus today. Giddan (1988) has explained that the first year of college is the most challenging period of adjustment a student faces. A student's time at college is oftentimes the first exposure he or she may have to becoming socially, financially, and academically independent. College students find themselves in a new environment filled with a broadening sense of independence and self-reliance among other lifestyle demands which can result in stressful and potentially dangerous consequences including increased risk for psychiatric disorders or the exacerbation of pre-existing problems (Cleary et al., 2007). This struggle of students' transition to college is often marked by deterioration of their mental and physical health (Gallagher, 2006), causing concern among researchers while universities scramble to react.

Several national surveys and longitudinal cohorts have revealed that the transition from high school to college is a risky time period for excess weight gain (Nelson et al., 2008). In 2006, the American College Health Association's National College Health Assessment identified that 31% percent of college students are overweight or obese (ACHA, 2007), however a more recent report published by the same organization in 2014 recognized that 40.6% of college students now fit that classification (ACHA, 2014).

Obesity is essentially a "complex adaptation to existing environments that greatly favor high energy intake and low energy expenditure" (Sparling, 2007). This rise in obesity is inherently

connected with declining levels of physical activity among college students as the most accelerated drop in an individual's physical activity comes between the ages of 18 and 24, precisely when many young adults are attending college (Grace, 1997).

These disturbing trends also extend to students' mental health as in a recent study it was found that 92% of college counseling center directors report that the number of students with severe psychological problems has increased in recent years (Gallagher, 2006). The stresses of the transition to college and subsequent college life contribute to several of the emotional and mental symptoms within college students including fatigue, depression, anxiety, and an inability to cope. For the purposes of this research, stress refers to a substantial imbalance between one's environmental demands and human response capabilities (James and Gilliland, 2012) and has been successfully linked with physical health issues (Sagerstrom and Miller, 2004) and weakened mental health (Hammen, 2005). Furthermore, analysis has identified that excessive stress will reduce work effectiveness, contribute to bad habits, and result in long term consequences such as poor academic performance, school dropout, and burnout (Grace, 1997).

In recent decades, it has been identified that these physical and mental health factors are quite interrelated and will act as a moderator upon one another (Duvall, 2011). Cerin et al. (2009) describe that frequent moderate physical activity has been shown to result in higher psychological

wellbeing, and more specifically Bray and Kwan (2006) note that physical activity is closely associated with improved psychological well-being during students' transition to college. On the other hand, Reiche et al. (2004) note that stress and depression can result in impairment of one's immune system and may promote the initiation and progression of some cancers.

The built environment, among many other correlates, reportedly, has played important roles both on physical activity and mental health. (Evans, 2003; Frank et al., 2003). The university campus represents a built environment within which students spend much of their time during their college career, and therefore provides a unique opportunity for investigation into how changes to the built environment can promote both physical activity and mental health. Within the university campus, the identification of spaces which have the greatest opportunity to promote both physical activity and mental health becomes vital.

Campus streets, as established linear connective tissues within the university provide a unique opportunity for exploration into a designed solution as they hold potential for establishing bicycling and walking networks to promote physical activity through active transportation. Furthermore, streets are typically the most hardscaped and chaotic spaces within the campus, making them one of the most stressful and least mentally restoring spaces to inhabit (Cooper Marcus and Barnes, 1999; Ming Kuo, 2010).

The street is one of the most typical circulators of pedestrians and bicyclists in the campus environment, yet remains the single most dangerous space for these users to be on the campus (Toor and Havlik, 2004). The street itself is often surrounded by unidentifiable residual space which serves no functional purpose other than to separate modes of travel (Trancik, 1986). It has been noted that the automobile and infrastructure required to support it is "possibly the single largest contributor to overall deterioration of the campus environment and loss of community" (Kenney et al., 2005, p.169). Additionally, a recent survey conducted by the author identifies that students feel significantly more stressed out and less safe walking near a campus street than walking next to a natural area.

Consequently, the following dilemma emerges and is explored through a landscape architectural research and design approach.

## **PROBLEM STATEMENT**

Due to the significant life changes involved with transition from high school to college and subsequent college life, the mental and physical health of college students is deteriorating rapidly and leaving students ill prepared to succeed in their academic endeavors. Furthermore, the campus environments which students interact with on a regular basis, and specifically the streets within these environments, do not promote physical activity and mental health to the extent that they potentially could.



## FOUNDATIONAL PROJECT THEORIES

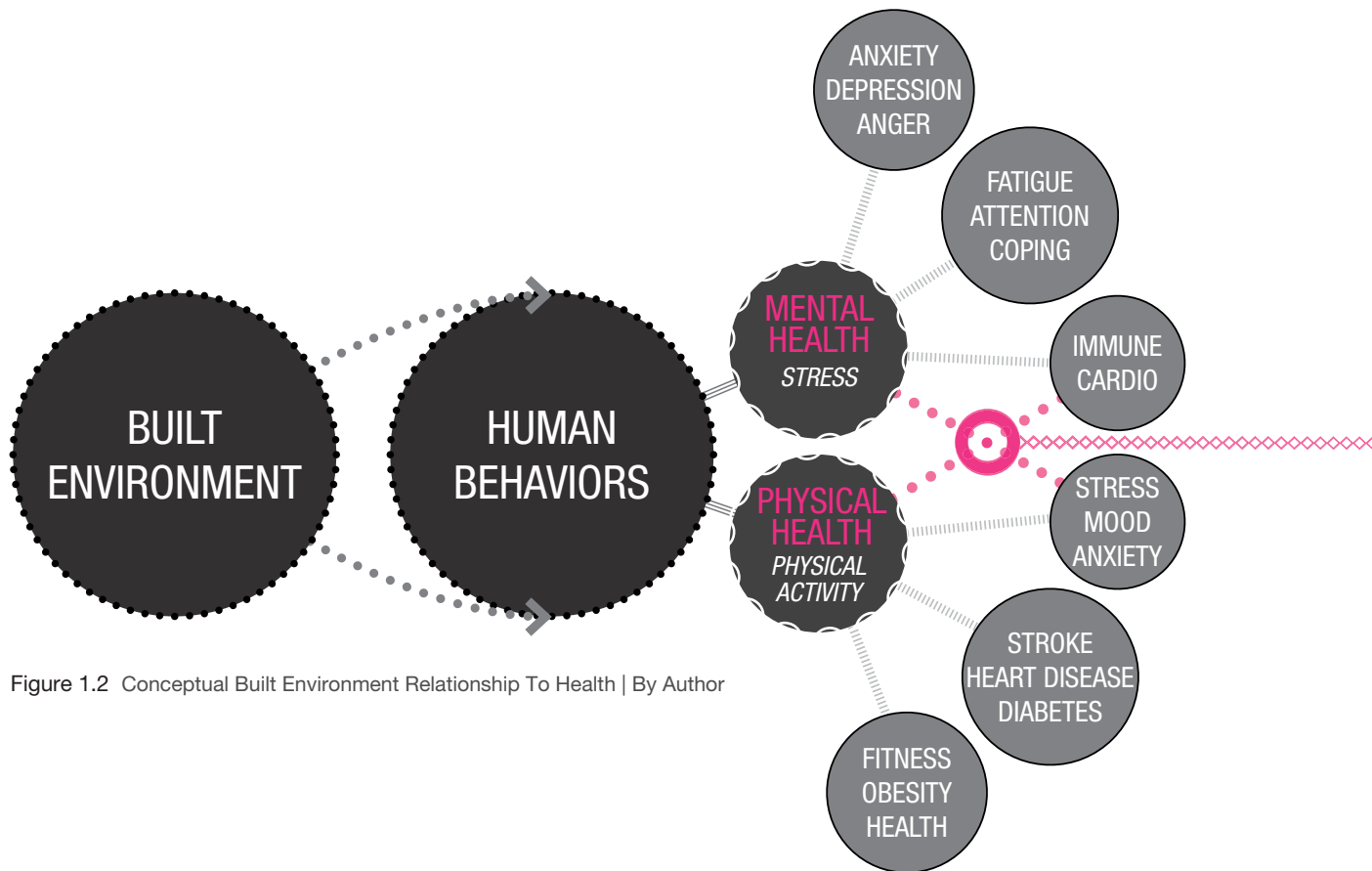


Figure 1.2 Conceptual Built Environment Relationship To Health | By Author

## BACKGROUND FOUNDATION

The thesis of this project is built on the recognition that a given built environment holds the potential to significantly define the behaviors and responses of individuals within that environment (Barker, 1968). The theory of behavior settings asserts that the observable environment exists entirely outside the realm of psychological processes of any individual (Barker, 1968). Barker further describes that a behavior setting has both structural and dynamic attributes that define a

“standing pattern of behavior synomorphic and circumjacent to the milieu,” (Schoggen, 1989, p. 34) meaning that through its encompassing similarity in structure to a standing pattern of behaviors, the setting becomes detached from its surrounding context and behavior (Barker, 1968). While every person will not act exactly the same way within any given behavior setting, the theory allows for recognition that common behaviors occur as direct responses to the surrounding environment (Schoggen, 1989). Thus, behavior settings help to rationalize the many relationships

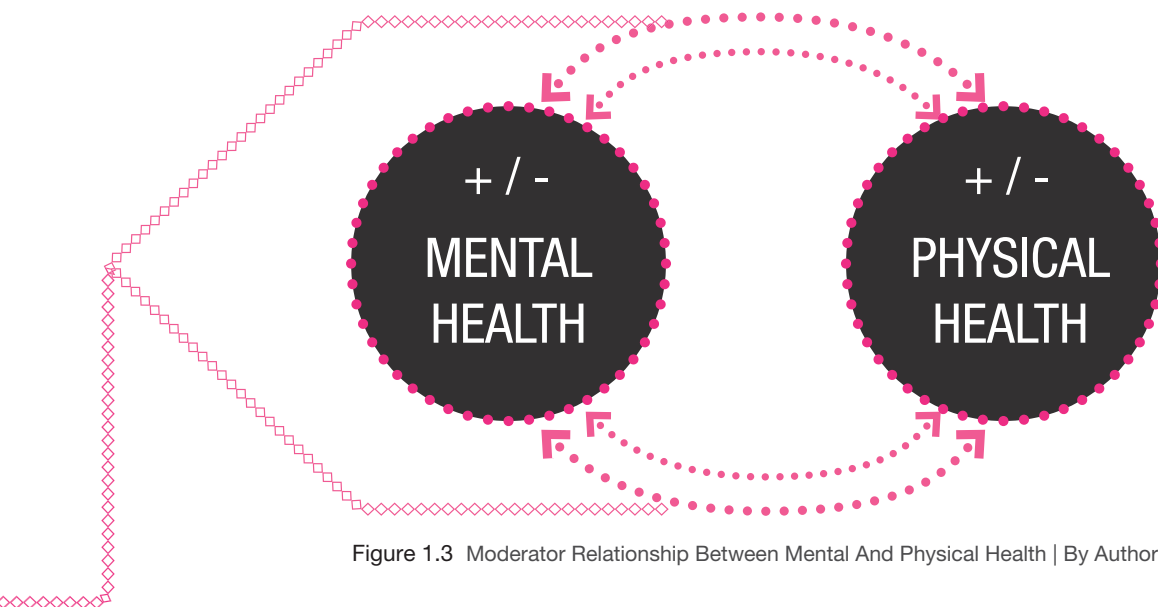


Figure 1.3 Moderator Relationship Between Mental And Physical Health | By Author

between the built environment and behavior. As behavior settings are instantaneous environments that in many ways define human activities within them, they provide a measured opportunity for alteration to create behavioral change among individuals within the milieu.

## AFFORDANCE THEORY

Affordance theory provides a strong theoretical foundation to frame the argument that changes to the built environment will influence behavioral outcome within that built environment. The theory explains a concept associated with behavior settings, and describes how humans perceive their immediate environment based on what it offers or provides to agents within them (Gibson, 1979). Affordances are definite and unchanging in their contribution of opportunities because of what it is rather than changes in the needs of the observer (Gibson, 1979). Affordances within an environment essentially act as clues to indicate the possibilities for action based on spatial relationships and elements. This concept is helpful to describe the choices available to a

human based on the way a given environment offers itself to being used. While humans can alter the affordances provided within an environment, our behaviors are still indivisible from the environmental characteristics of the milieu. By providing increased affordances for activities such as walking and bicycling, the built environment contributes to the possibility of this activity taking place (Greeno, 1994).

## MODERATOR EFFECTS OF PHYSICAL ACTIVITY ON MENTAL HEALTH.

Another defining feature that grounds research and design exploration within the project is the moderating relationship between mental and physical health outcomes. Essentially, as one's physical health improves, one's mental health will follow suit and vice versa. The recognition that mental and physical health do not exist outside the realm of the other's influence provides further support for the application of a built environment change to promote both as compounded benefits may be accumulated. This phenomenon will be further discussed and substantiated in Chapter 2.

# RESEARCH QUESTIONS



## QUESTION 1:

**HOW CAN CAMPUS STREET DESIGN IMPROVE THE COLLECTIVE MENTAL HEALTH AMONG COLLEGE STUDENTS?**



## QUESTION 2:

**HOW CAN CAMPUS STREET DESIGN PROMOTE PHYSICAL ACTIVITY TO IMPROVE THE COLLECTIVE PHYSICAL HEALTH AMONG COLLEGE STUDENTS?**

# PROJECT OBJECTIVES

## OBJECTIVE 1:

**TO DISCOVER HOW, THROUGH STRESS RELIEF AND RESTORATION, CAMPUS STREETS CAN IMPROVE THE COLLECTIVE MENTAL HEALTH AMONG COLLEGE STUDENTS.**

- 1-A. To identify the environmental factors of campus streets which are related to mental health among college students.  
*(Research Methods: literature review and survey)*
- 1-B. To explore specific spatial qualities, physical elements, and designed features that provide a restorative experience to users of a given environment.  
*(Research Methods: literature review and case study analysis)*
- 1-C. To re-design campus streets to mitigate stress and promote mental health among college students based on (1-A) and (1-B)  
*(Design Methods: corridor and site-scale design)*

## OBJECTIVE 2:

**TO INVESTIGATE HOW CAMPUS STREETS CAN PROMOTE PHYSICAL ACTIVITY TO IMPROVE THE COLLECTIVE PHYSICAL HEALTH AMONG COLLEGE STUDENTS.**

- 2-A. To identify the current affordances university streets have related to physical activity through active transportation.  
*(Research Methods: site analysis and survey)*
- 2-B. To recognize the impact changes to the built environment have on student commuting and physical activity patterns.  
*(Research Methods: literature review and survey)*
- 2-C. To determine what design and planning responses are most appropriate to afford students opportunities to engage in physical activity through active transportation.  
*(Research Methods: Through literature review and case study analysis)*
- 2-D. To re-design campus streets to provide increased affordances for physical activity through active transportation based on (2-A), (2-B), and (2-C).  
*(Design Methods: campus and corridor scale design)*

\* Note: 1-A through 2-D are corresponding sub-questions.

# PROJECT STRUCTURE & PATH

Through initial identification of the moderating effect between physical and mental health, the project evolved to explore a multi-faceted solution to the previously described dilemma. An initial literature review was conducted to identify potential realms of research and design exploration for further investigation. This process led to the recognition of the mentally restorative powers of nature and physical health benefits of active transportation. Subsequent thought and interest evolved relating to ways in which a built environment could promote physical activity while simultaneously acting as a mentally restorative setting. Through personal analysis and synthesis of the Kansas State University Master Plan, it was identified that proposed vehicular street conversions into pedestrian malls provided a unique opportunity to design a linear “garden street” to accomplish these two goals.

From its initiation, the project was envisioned as an opportunity to present visionary conceptual design thinking to campus decision makers and stakeholders. The overarching goal of the project is to illustrate a utopian design solution free of the budgetary influences that so often define decision making within the campus environment with the simple intention of planting a seed of thought in a decision maker, donor, designer, or fellow academic’s mind. By planting this seed, the project holds the potential to alter the currently uninspiring ways in which the design of campus circulation corridors are considered. Whether this seed of thought results in a few simple principles of restorative and active campus landscape design being considered in a future project or a holistic

application of recommendations outline by this document, the success of the project will be measured by the amount of amount of times future readers of this document consider for just a moment the power and beauty in the juxtaposition of the project’s defining phrase:

Garden. Street.

Due to significant restructuring in January 2015, the project was certainly quite accelerated; however the methods undertaken to identify research and design solutions that respond to the previously defined dilemma encompass a wide range of theoretical and practical knowledge. As the research questions outlined on the previous spread are focused on two objectives which are rarely examined in unison within a research setting, two parallel threads of methods were utilized as seen in Figure 1.4. Both threads draw from a significantly different body of research through quite similar methods to allow for ease in synthesis and translation between the two bodies of research findings described in further depth in Chapter 4.

As the project first defines a framework for creation of restorative and active campus streets, the research to support such a product must remain generalized to the typical campus case. Methods completed towards the beginning of the Spring 2015 semester were generally much more conceptual in nature while those completed later in the semester were much more grounded in the realities of specific design decisions. Campus specific investigation is only conducted during

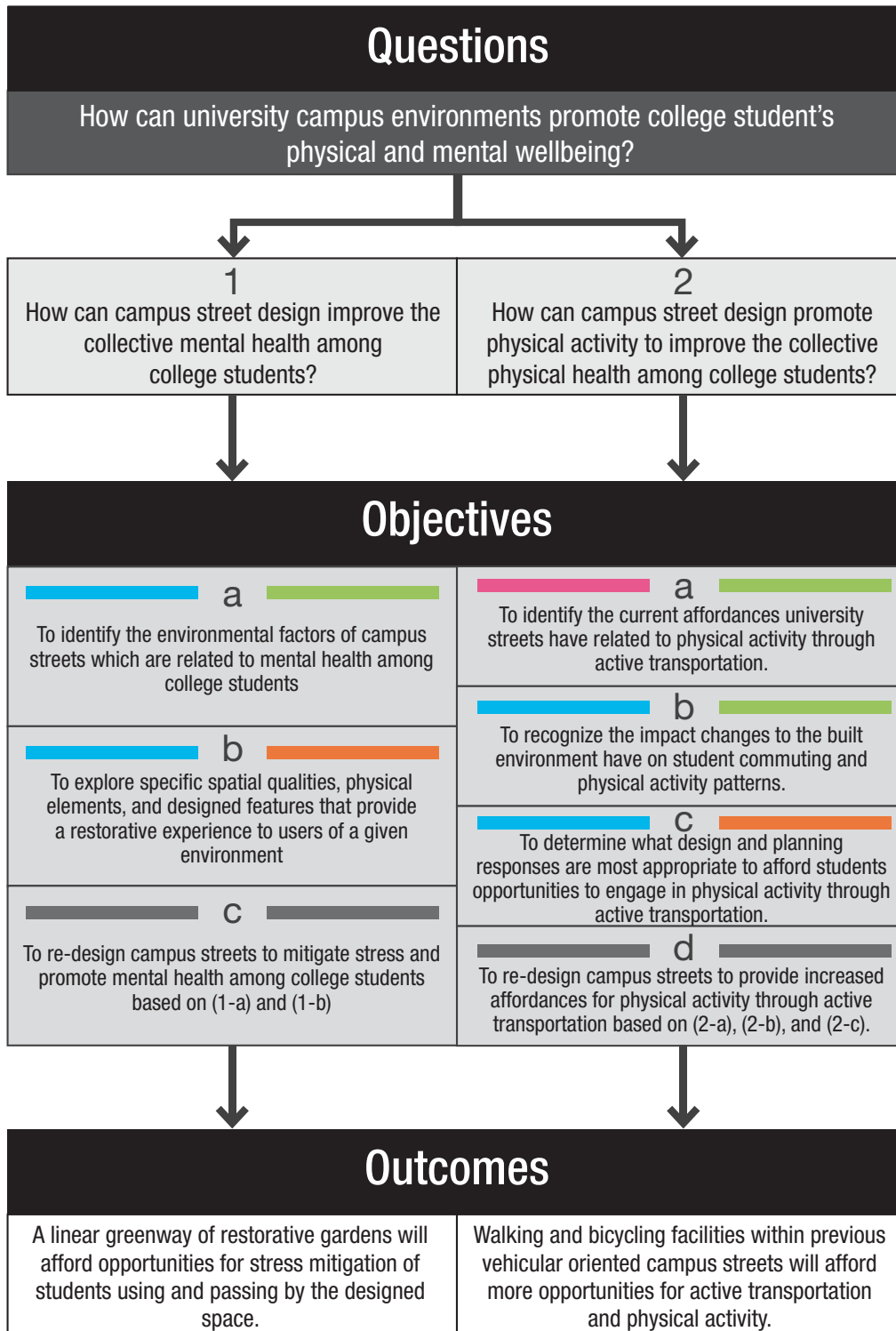


Figure 1.4 Project Structure And Outcomes | By Author

the design application portion of the project to illustrate how this framework may be applied in a real world university campus scenario. The project's path appears to be structured in a quite linear and logical manner, however, the process of analysis and synthesis of the various methods undertaken was quite cyclical and self referential.

The path taken to complete this project is illustrated to the right in Figure 1.6 as a series of related methods followed by synthesis, investigation, and design application. The process is based heavily in the interpretation and application of research findings by the author as a creator through design application. A significant portion of the depth and breadth of knowledge accumulated during the execution of the project is extracted from a comprehensive review of literature directly related to project specific goals. This expedited literature review was conducted beginning in January and persisted through early

April. The path of methods completed in the completion of the project began quite broad and became increasingly more specific as the research and design focus narrowed to its current form. Upon defining major conceptual and theoretical project boundaries through the literature review, case study analysis of several related active and restorative projects is undertaken to supplement conceptual knowledge with real world solutions.

Lastly, methods related to the completion of a design application were undertaken to provide key evidence to inform planning and design decisions at three scales. Site analysis at Kansas State University is performed and a survey of students at the university is used to identify case specific findings related to specific site selection, mental and physical health realities and potential change. All of these methods are then applied to a comprehensive design proposal within the Mid Campus Drive corridor of Kansas State University.

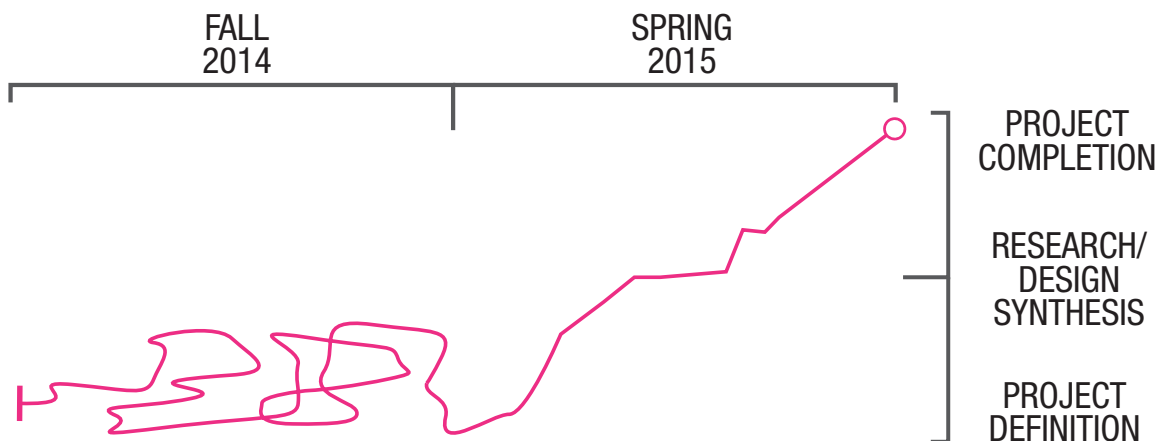


Figure 1.5 Overall Project Path | By Author

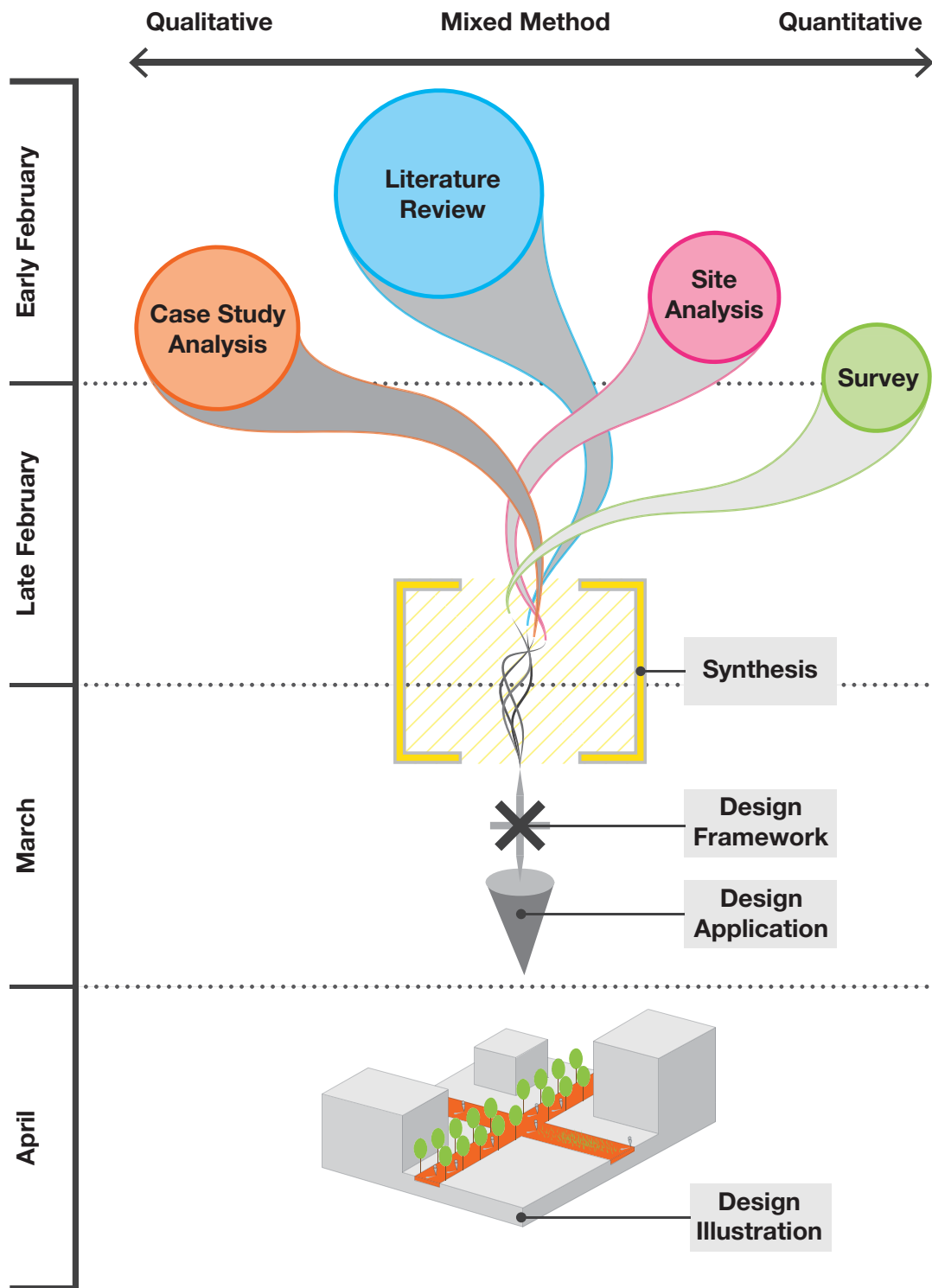


Figure 1.6 Illustrative Project Schedule Diagram | By Author



# PROJECT RELEVANCE

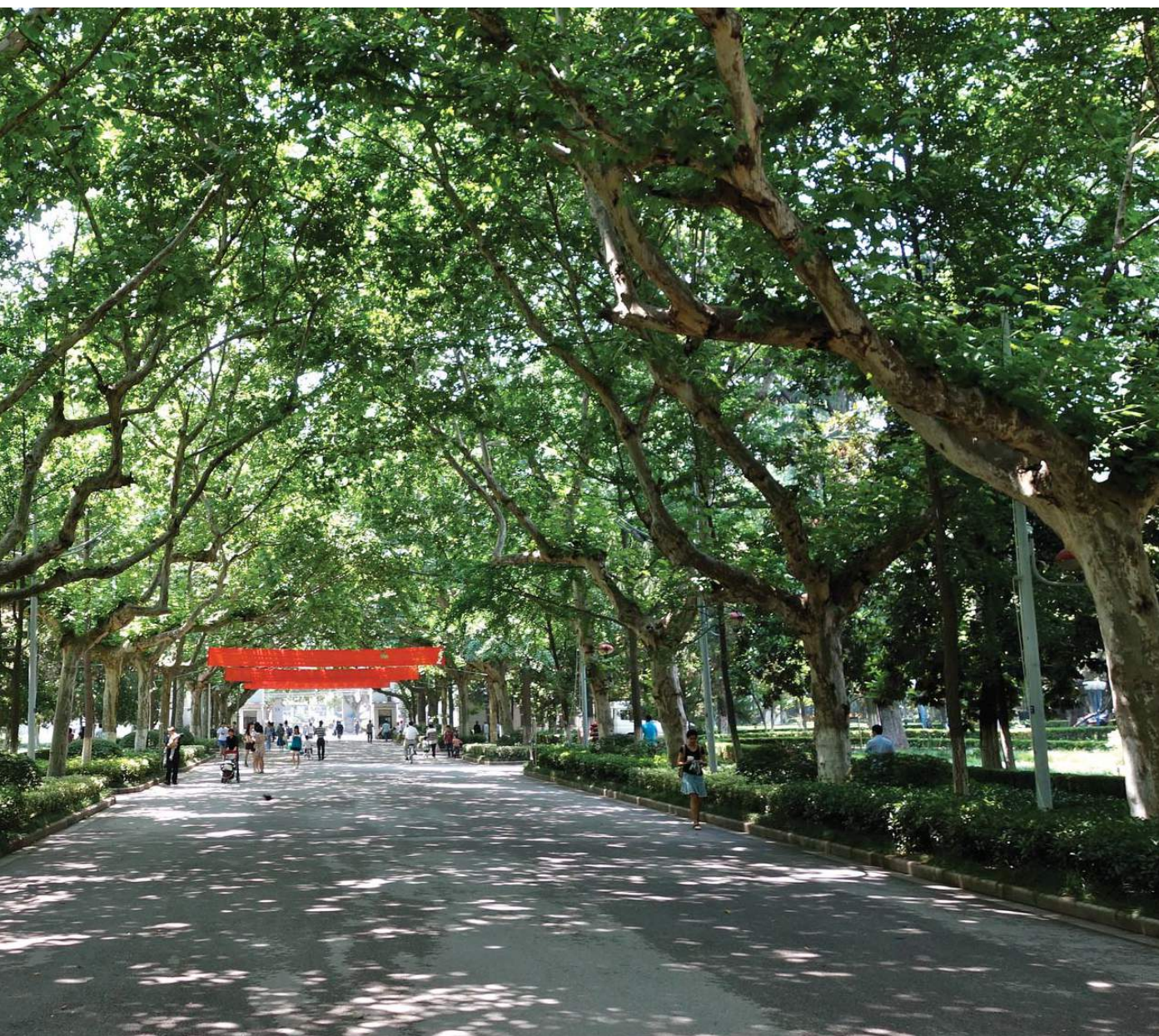
There is a distinct lack of literature related to the application of restorative landscapes within the university campus environment, providing an opportunity to explore this application. While active transportation within the campus environment has been well documented and explored for several decades, there is a unique opportunity to explore the relationships between the physical health benefits of active transportation and the mental health benefits of restorative landscape design. Through designed solutions, landscape architects can potentially craft spaces to positively impact the health, performance, and learning of students attending universities across the nation.

The Council of Landscape Architectural Registration Boards identifies that landscape architecture impacts public welfare in seven distinct ways, one of which involves the ability to “promote public health and well-being” (ERIN Research, 2010). This project identifies design guidelines which landscape architects can utilize to justify design decisions to improve mental and physical health within the context of the university campus. As landscape architects continue to seek out validation of their importance in the public eye, this exploration into the benefits that design may provide related to physical and mental health will help distinguish the competency of landscape architects looking to the future. Overall, this project holds the potential to shift how both university administrators and landscape architects think about shaping the spaces that students, faculty, and staff interact with on a day to day basis.



Figure 1.7 Monumental Pedestrian Boulevard Within The Campus Of Nanjing University | Courtesy Of Flickr User Kevin Dooley





02

## **LITERATURE AND CASE STUDY ANALYSIS**

An exhaustive literature review is completed first to provide background knowledge related to the main topics to be explored within the report, and second to identify design principals and themes to provide resolutions to the project's research questions. This literature review acts as the primary conceptual source for the development of design frameworks in the synthesis chapter of this report. Case study analysis based on themes identified through literature then identifies practical design solutions to inform the future creation of restorative and active design frameworks.

# LITERATURE MAP

The literature map on the facing page (Figure 2.1) illustrates the organizational approach utilized to analyze and categorize relevant information. The analysis categories are defined by the main project objectives in order to extract conceptual and theoretical findings to apply to the creation of a design framework. A wide variety of sources from many linked backgrounds was reviewed to provide a strong conceptual foundation to the project and this chapter reflects a summarized version of findings identified through the literature review. The individual ideas and findings drawn from each source hold a great deal of value, but the true power of the review comes in its ability to draw connections between relevant topics. The review of literature is not defined within a given time frame, but rather occurred organically throughout the Spring of 2015, allowing an evolving type of knowledge to systematically be added to the synthesis of findings in Chapter 4.



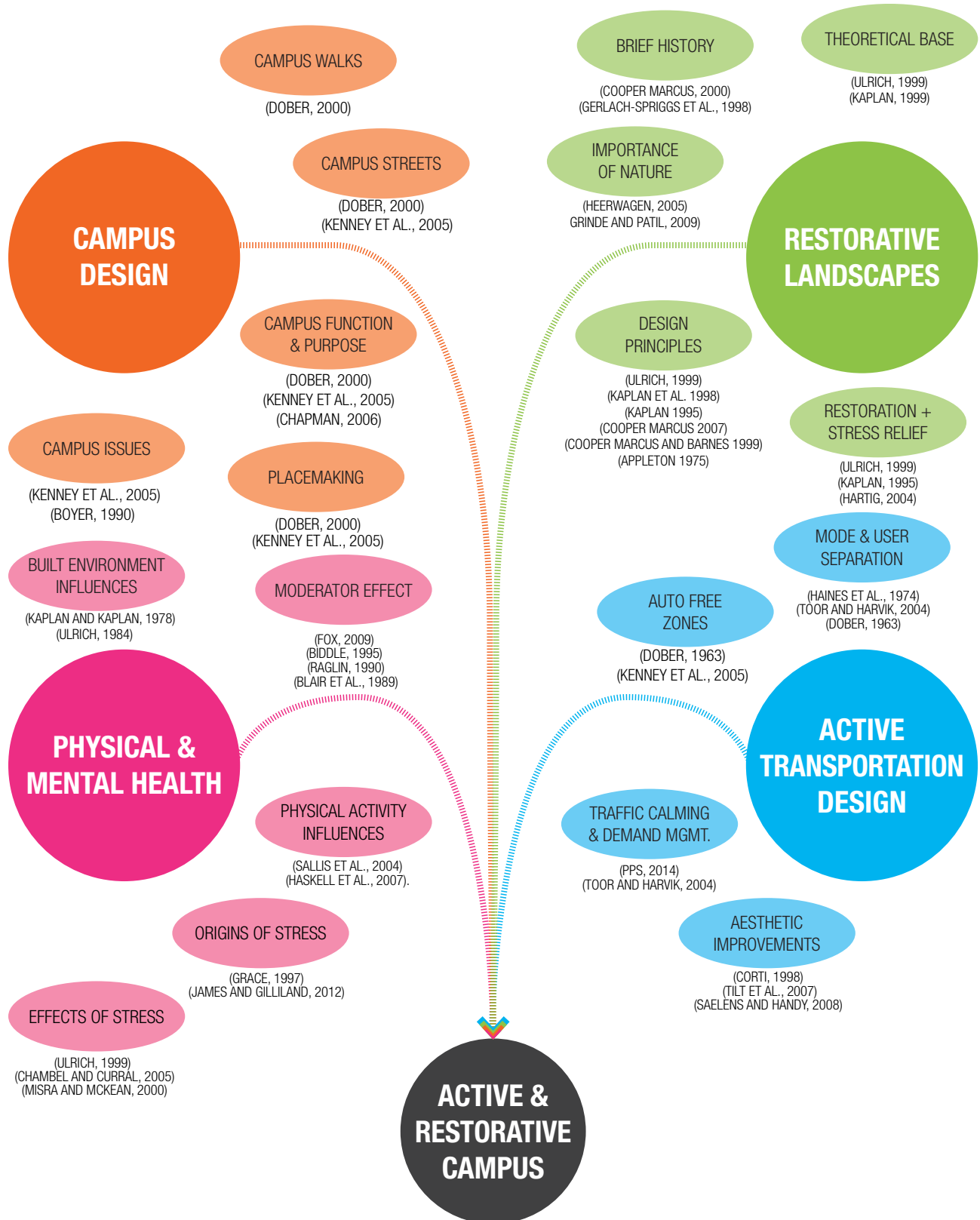


Figure 2.1 Literature Map | By Author

# CAMPUS DE SIGN







# CAMPUS DESIGN

## UNIVERSITY CAMPUS ENVIRONMENT

The university as an institution is a socio-cultural powerhouse which can bring forth innovative thinking, tangible societal change, and connectivity between fertile minds. The distinctly American campus which we have come to know is a physical manifestation of its own unique and American history (Chapman, 2006). Through time, the university campus has both shaped, and been shaped by the constantly shifting paradigms of culture, development, technology, and history. The open spaces of a university campus work as a connective tissue of surrounding environments by defining and organizing the spatial experience of the campus. Moreover, the outdoor spaces of campus can provide a sense of direction, acts as a container for a wide variety of programmed and spontaneous activities and discussions, and provide a delightful aesthetic experience by creating attractive settings and establishing a unified design framework.

The campus has in many ways has become a “cultural landscape imbued with deep social purpose, more so because it is a landscape in which what is done and experienced ultimately affects society as a whole” (Chapman, 2006, p. xxxiv). A campus’ ability to exist within our memory as a recollection of a place rather than a space is based in large part on their ability to express the identity of that specific institution. Chapman goes on to note that the campus must in some way or another “say something to its constituents about the institutional values and why those constituents are joined in both the

personal and the civic pursuit of those values in that place” (Chapman, 2006, p. xxxi). A college campus is therefore at its most basic form; a physical representation, even a living manifesto, of the institutional goals that drive a particular university or institution.

Beyond the circulation and spatial use functions afforded by its physical manifestation, the university campus also acts as a marketing asset to attract new students. In a national study of 55,000 students, over 60 percent of first year students attending four year public and private institutions listed campus appearance as important or very important when deciding where to enroll (Noel-Levitz, 2012). The campus landscape is the container within which all outdoor community building, socialization, and circulation takes place and its importance to defining the identity and values of an institution must not be ignored (Kenney et al., 2005). The outdoor spaces on a university’s campus are therefore vital to drawing new students and faculty to the institution while simultaneously meeting the immediate needs of those currently at the institution.

55%

of students surveyed described the **aesthetic character** of campus as **“very or extremely important”** to their **decision to attend** Kansas State University



(online survey by author, 2015)

Figure 2.2 (Preceding Spread) UTD Campus Mall | By Wikipedia User: Stan9999

## **CAMPUS ENVIRONMENT & SENSE OF PLACE**

Richard Dober defines campus placemaking as “the structuring of the overall design, the broader skeleton, the articulated pattern” and goes on to explain that this framework allows specific design solutions to meet a set of overall functions, objections or visions (Dober, 1992, p.4). Placemaking, in that sense is a tool to sensitively deal with varying sets of local conditions and influences independently while still maintaining clarity at a campus wide level. Creating and maintaining a unique sense of place within the physical realm of the campus is extremely important to crafting an identity for a university setting and should related to the regional context of the university to remain true to the genius loci of a place. Dober (1992) carries on by further explaining that each small action or large scale plan should in some way contribute to a larger vision of the campus identity as a whole.


In a general sense, campus design is “the culminating act of those processes and procedures that give form, content, meaning, and delight to the physical environment serving higher education” (Dober, 2000). The design and planning of a campus gives it structure to support change and evolution through time. As a physical representation of an institution’s goals, the campus is tasked with remaining true to the values which created and currently uphold a university. A campus landscape has the opportunity deepen the way people experience it by establishing meaningful places within its bounds (Kenney et al., 2005). The moments of

transition and arrival within a campus are what leads to the creation of extremely special and seemingly timeless environment.

Dober (2000) furthers this argument by describing that the campus can be described as a series of interconnected experiences made up of unique landscape mechanisms that one may encounter on a journey through the university. In constructing the campus as a series of inter-related transitions, arrivals, and snapshots of experiences; an overall framework can be established to explore the transformation of neglected infrastructural spaces of the campus street into a memorable, meaningful, and functional place.

## **CAMPUS STREETS & WALKABILITY**

Streets play a major role in structuring the physical planning of campus environments, and therefore must be planned to “serve, not dominate, the campus scene” (Dober, 2000, p. 106). These streets carry traffic from gateways at the periphery of the campus either to campus destinations such as parking lots and drop-offs or other campus exits and gateways. Functionally, outside of facilitating daily circulation for single occupancy vehicles and transit services, campus streets provide emergency and service access to adjacent buildings (Dober, 2000). Since many university campuses have developed as parklike environments, these corridors are very important to ensure continued functionality of the university. While campus streets have the potential to be positive features of the landscape, when they are designed as the least expensive and



most convenient manner and intersect too often with pedestrian flows, they act as safety hazards and obstacles to movement (Dober, 2000).

Walking is an extremely important function that university campus design must facilitate as all modal trips end in walking. Kenney et al. (2005) describe that the university campus should be pedestrian oriented because it is the healthiest transportation option and most conducive to promoting increased community. As a general rule, the campus walks within the central campus should be direct, continuous and free of conflicts with vehicles (Dober, 2000). While students interact with only select cases of campus architecture throughout the week as determined by their schedule, they interact with the outdoor landscaped campus by walking as many as a dozen times per day. Movement through campus walks holds the unique opportunity of crafting a pleasant, beautiful, safe, and memorable experience. While traveling along campus walks should first be efficient, the impact of a high quality landscaped environment on one's senses should not be overlooked (Dober, 2000). Overall, campus walks represent a highly functional and active space within the campus with significant potential to provide restoration and stress relief.

The creation of specifically designated automobile free zones within the university campus is another strategy to create modal separation and allows for a more human scale and pedestrian friendly environment. By creating a well-designed pedestrian campus core, the spatial experience of the campus will be enhanced and further

encourage longer walking trips (Kenney et al., 2005). Dober (1963) builds on this argument and states that a preliminary planning goal of every university should be in the "creation of traffic-free pedestrian precincts." By increasing the size of this pedestrian zone within the campus, the amount of modal conflict will be substantially reduced, resulting in increased pedestrian safety. Additionally, the recovery of spaces within the campus formerly dominated by the automobile results in increased opportunities to create aesthetically pleasing spaces to further increase interest in active transportation participation (Tilt et al., 2007; Van Dyck et al., 2012).

## **ISSUES ON CAMPUS ENVIRONMENTS**

As students, faculty, and the surrounding context have changed and evolved, so to have the campus' physical environments. Community in this context refers generally to a sense of self realized identity with one's peers, institution, and campus that persists far beyond one's actual engagement with the physical spaces of the university (Kenney et al., 2005). Paul Turner describes that the campus is in many ways a microcosm of a city environment, in that it has been constantly molded through time by the desire to create a utopian style of community (Turner, 1987). As a microcosm of a city environment, the campus must seek to provide opportunities for gathering, socializing, and spontaneous meetings between scholars and students. Payne (2009) describes that the natural scenery and a relaxing atmosphere within campus open spaces encourage impromptu meetings and discussions, and provides fresh air

for busy and stressed scholars.

In recent years, however the level of community on university campuses has been cause for great concern. A report created for the Carnegie Foundation for the Advancement of Teaching warns that there is a “crisis in community” on campuses, a problem that potentially contributes to rising campus crime rates, sexual harassment, ethnic and racial hostilities, substance abuse, apathy, and a general decline in civility (Boyer, 1990). To attend to these needs to create community, a university campus must act as a legible space for providing lively and stimulating campus life while maximizing the potential opportunities for students, faculty, and staff to meet and engage one another.


The university’s overarching goal is to promote the free exchange of ideas, a task which is not possible to achieve without instilling the campus with opportunities for interaction (Kenney et al., 2005). A physical campus design which maximizes the probability of these chance encounters between students and subsequently provides spatial settings to allow lingering after enabling these encounters will likely result in increased engagement and community. Kuh et al. (1991, p. 309) further supports this, explaining:

*“... interaction among community members is fostered by the availability of indoor and outdoor spaces where people can come together without much effort. Institutions should consider whether their campuses have adequate places that encourage spontaneous, informal interaction among students”*

Kenney et al. (2005) lay out a hypothesis of several inter-related factors that they believe are responsible for this loss in sense of community, one of which is the “suburbanization of the physical campus layout”. The suburbanization of the campus refers to the trends in campus design towards larger and more isolated buildings as well as a shift in planning focus from the demands of the automobile rather than the demands of the human. This leads to vast, foreign, and unfriendly infrastructural non-places which invade the former clarity of the campus landscape.

Kenney et al. (2005) describe the automobile as potentially “the single largest contributor to overall deterioration of the campus environment and loss of community” (p. 169). Individuals driving to campus are much less likely to experience chance encounters and subsequent social interaction with their peers, further contributing to the loss of community within the university campus. They continue to comment that societal issues and technological evolution certainly play into this effect, however one cannot underestimate the role of the physical environment in facilitating community. Chapman decisively remarks that until the eve of World War II, American university campuses generally had a “spatial clarity reflecting its classical heritage” and “was easy to comprehend and easy to get around” (Chapman, 2006, p. 2).

The university campus was originally true to the needs of its students, professors, and surrounding community by providing human scaled walking, gathering, and meeting places. The demands



placed on the built environment due to the increasing popularity of the vehicle took their toll on the campus environment as they did on the country as a whole from World War II onward. Chapman continues to explain that pedestrian oriented places and walking routes were replaced quickly with vast parking lots and vehicular access routes. Oftentimes, more land was dedicated to storage and movement of cars than to living or learning activities which had permeated the American campus for the previous three hundred years. Perceived convenience trumped spatial cohesiveness as vehicle drop-offs, thoroughfares, and parking lots invaded the once tranquil campus cores across the country. Kenney et al. (2005, p. 171) describe five main impacts of the automobile within the campus environment which include:

- *Loss of green, pleasant, aesthetically attractive space in central campus areas*
- *Traffic with attendant driver and pedestrian injury on and near the campus*
- *Student health problems and unhealthy habits*
- *Environmental impacts*
- *Increased impact in neighboring communities*

During the middle of the 20th century, congestion and conflict between modes of travel became common occurrences as the campuses reflected the changes to automobile dominated planning of the society and culture within which they existed (Chapman, 2006). The presence of the automobile results in many spaces within the campus being shared between vehicular traffic and pedestrian and bicycle functions, oftentimes causing modal

conflict resulting in unsafe conditions for walking and bicycling (Toor and Havlik, 2004). These unsafe, illegible, and unpredictable conditions will often deter students from participating in active modes of travel, and put students who do walk and bicycle in dangerous situations. The pedestrian transitioned from the central focus of campus planning to a sort of secondary agenda whose needs were accommodated after those of the automobile.

There has been a growing trend towards pedestrianization of the campus in recent years as universities recognize the detrimental effects of vehicle oriented development. By creating a pedestrian oriented campus, students will find it easier to walk to and between classes, become more socially engaged with students around them, and reduce stresses related to walking near vehicular streets. Campus planners and designers today are finding new ways of re-establishing the clarity and spatial relationships that campuses often held in the past by limiting or removing vehicular access to streets within the campus core as a way to tame the automobile Kenney et al. (2005). These street closures provide an opportunity to reclaim residual infrastructural spaces, create more aesthetically pleasing pedestrian malls, and reunite the campus landscape as an integrated whole. Several exemplary cases of campus street closures intended to create a more cohesive campus environment and promote walking at four universities in the United States are outlined and analyzed later in this chapter.





Figure 2.3 Campus Life | By Flickr User: University of Central Arkansas



# MEN TAL & PHY SI CAL HEALTH







# MENTAL & PHYSICAL HEALTH

## MENTAL HEALTH ON CAMPUS

A significant health crisis exists on university campuses today. Students are showing trends of deteriorating mental health (Gallagher, 2006), which can significantly alter their abilities to perform in an academic environment (Grace, 1997). The World Health Organization defines mental health as a “state of well-being whereby individuals recognize their abilities, are able to cope with the normal stresses of life, work productively, and make a contribution to their communities” (WHO, 2002). Early adulthood and the transition to college life is often characterized by “the pursuit of greater educational opportunities and employment prospects, development of personal relationships...” which offer individuals significant potential for personal growth, however they may also “result in stress that precipitates the onset or recurrence of psychiatric disorders” (Blanco et al., 2008, p. 2).

Within the past decade, university counseling centers nationwide have reported a shift in the demands of students counseling services from more benign or nonthreatening developmental and informational needs, to more serious psychological issues (Gallagher et al., 2000). Moreover, in a recent study, it was found that 92% of college counseling center directors believe that the number of students with severe psychological problems has increased in recent years, representing a major concern for their centers (Gallagher, 2006). High stress levels and the ability to cope with stressors have been shown to have significant impact on mental

health issues ranging in severity of anxiety to debilitating depression (van Praag, 2005). Outside of the detrimental effects to mental health, stresses related to university life can also significantly impact performance of critical tasks. The importance of stress reduction to prevent the potential development mental health issues within a college’s student body is important as psychiatric disorders have been shown to negatively effect students’ academic performance (Hamaideh, 2011) and disrupt college attendance while also reducing the probability of successful graduation from college (King et al., 2006). As a university’s primary goal is the education of its students, this potential reduction in graduation rate marks a pressing issue for the university to explore.

Stress refers to a substantial imbalance between one’s environmental demands and human response capabilities (James and Gilliland, 2012) and has been successfully linked with physical health issues (Sagerstrom and Miller, 2004) and destabilized mental health (Hammen, 2005). This oftentimes results in a depletion of the body’s resources to respond to demands and perform tasks due to the attempts made to cope with these environmental exchanges. Stress related mental health disorders are responsible for 60% to 90% of all visits to healthcare professionals across the nation (Grace, 1997), and therefore represent an important problem to mitigate.

While stress is a natural response to the demands of everyday life, and is not necessarily a dangerous when kept in check, chronic or recurring stress can

Figure 2.4 (*Preceding Spread*) Light Walk in October | By Flickr User: Hartwig HKD

significantly suppress body functionality and lead to depression, sleeplessness, anxiety, irritability, under stimulation, and anger (NIMH, 2014; Ulrich, 1999). Four interrelated types of changes brought on by stress based on psychological, physiological, neuroendocrine, and behavioral factors have been identified through research (Ulrich, 1999). Psychological elements include emotional reactions and intellectual evaluation of various situations. Physiological responses may create disturbances in bodily activity levels such as blood pressure, skin conductance, and rate of breathing. Neuroendocrine factors involve the secretion of hormones that stimulate the heart and blood vessels. Lastly, behavioral changes may be marked by sleeplessness, substance abuse, anger, helplessness, and passivity (Ulrich, 1999).

An individual's time spent at college oftentimes represents the first extended period of time without the physical, social, and financial support of their family and other close friends. The pressures of fitting in to a new environment and adapting to a new lifestyle can become overwhelming to many students. In fact, surveys have shown that a growing number of university students are experiencing significant stress due to interpersonal conflicts, self-esteem problems, financial constraints, time constraints, general frustration, and emotional problems (Chambel and Curral, 2005; Misra and Mckean, 2000). Hammen (2005) notes that stress contributes to several of the emotional and mental problems specifically seen within college students including fatigue, depression, anxiety, and an inability to cope.

## THE BUILT ENVIRONMENT & MENTAL HEALTH


The built environment is most generally defined as the part of the physical environment that is constructed by human activity (Saelens and Handy, 2008) and through the field of environmental psychology, has been shown to be both potentially supportive and damaging to an individual's psychological and emotional needs (Kaplan and Kaplan, 1978). The quality of a space therefore largely determines the quality of the experiences which take place within the given space. Greene (1994) remarks that if a landscape is deficiently designed without any consideration to the experience of a user and the environmental stressors they may encounter, that user may actually experience increased stress and anxiety. Ulrich (1984) has concluded that increasingly urban environments elicit more negative feelings, increased fear, shortened attention, and less restoration from stress than their more natural counterparts. The built environment may initiate these stressors through a variety of factors including poor air quality, noise, lack of thermal comfort, lighting quality, or undesirable odors.

71 & 79%

of students surveyed identified **streets and parking lots** as the most **stressful and anxiety** inducing environments on campus respectively



(online survey by author, 2015)



For example, noise as a stressor can result in sleep deprivation, fragmentation, low oxygen saturation in blood, high blood pressure, and poor performance of tasks (Hartig et al., 2003; Ulrich et al., 2003). Furthermore, it has been observed that when people lack access to nature, or are met with environments that may be “noisy, chaotic, illegible or dangerous” it can add to their perturbation and anxiety (Kuo, 2010, p. 24).

## **PHYSICAL ACTIVITY ON CAMPUS**


For the purposes of this report, physical activity as a broad term will be used to describe any form of muscle movement that produces energy expenditure (Sallis et al., 2004). A substantial amount of research has been conducted in recent decades to provide evidence linking regular physical activity to various physical health outcomes in adult populations (de Nazelle et al., 2011). Physical activity lowers the risk of early death, obesity, heart disease, stroke, Type 2 diabetes, high blood pressure, and certain kinds of cancers. Recently released, updated recommendation for adults from the American College of Sports Medicine and the American Heart Association recommend participating in 30 minutes of moderate-intensity physical activity on five days of the week to achieve good health (Haskell et al., 2007).

While previous recommendations were focused on more structured guidelines related to more purposeful and formalized exercise, the new guidelines identify the importance of active living and shift their focus from exercise to physical

activity in a more broad sense. Haskell et al. (2007) further explain that one’s daily goal for physical activity can be met either in whole or separated into ten minute periods of activity throughout the day. The ability to separate brief periods of physical activity is particularly relevant to college students who may have the opportunity to commute between their home and campus several times a day. This measured shift in focus towards active living rather than specific exercise is aimed to lessen the impact of the current obesity epidemic by providing realistic goals to be met by individuals nationwide (Sallis et al., 2004).

Even though these physical activity recommendations have been clearly communicated through a wide variety of media and marketing techniques, an overwhelming lack of physical activity participation still exists among the general population and more specifically among American college students (Sallis et al., 2004; Kilpatrick, 2005). Indeed, only 38% of college students are involved with regular vigorous activity while 20% of students are involved with regular moderate activity. In comparison, 65% of high school students reported regular vigorous physical activity and 26% reported that they participate in regular moderate activity (Kilpatrick, 2005). These significant drops between high school and college are oftentimes attributed to the stressful transition into a more independent and demanding lifestyle.

Giddan (1988) explains that the first year of college is the most challenging period of adjustment a




student faces, potentially explaining some of these drastic changes in behavior. Complementary research suggests that a substantial portion of students on a college campus are characterized by a sedentary or inactive lifestyle (Pinto and Marcus, 1995). The busy schedule of a college student, adaptations related to one's social life, and level of independences may be factors in this period of behavioral change. The emergence of less active, sedentary lifestyles of college students has become troubling as physical inactivity is a well-documented risk factor for numerous chronic diseases that afflict many Americans including coronary heart disease, stroke, some cancers, diabetes, obesity, and depression (Sallis et al., 2004). Identifying strategies for increasing the physical activity is therefore a pertinent issue facing educational institutions across the country.

The considerations for improving physical health of college students are becoming extremely important to developing healthy lifestyles as Leslie et al. (2001) remark that college students inhabit an environment in which sedentary behaviors (particularly studying and computer/internet use) are promoted while students are educated for particularly sedentary careers. As students become increasingly sedentary through immersion in technology and their studies, these dangers become more and more pronounced and require planning and action to counteract. During this period in a young adult's life, significant lifestyle choices are explored and tested, leaving students' physical activity susceptible to a variety of related influences. These lifestyle choices and patterns established during an individual's time at

college are often carried forward into their future lives (Leslie et al., 2001; (Zick et al., 2007), making college students a very important demographic to respond to in order to promote overall public health. Universities have an immense potential to influence a large amount of the future leaders, policy makers, planners, and designers during their time on campus as they carry these behaviors and lifestyle choices forward into their lives (Leslie et al., 2001). Overall, promotion of active transportation has far reaching benefits.

## **LINKING MENTAL HEALTH AND PHYSICAL ACTIVITY**

While the link between physical activity and improvements to physical health have been well studied and established, the ability of physical activity to influence mental health has only recently begun to receive more attention (Duvall, 2011). Health researchers have fortunately recognized the important role that regular physical activity can have in both maintaining and advancing mental health and psychological well-being. These relationships become particularly relevant to universities and more specifically college health providers, given the substantial epidemiological evidence to support the positive relationships between physical activity, physical health, and mental health (Raglin, 1990; Plante and Rodin, 1990; Blair et al., 1989). General physical activity has been shown to be positively correlated to mental health for several decades, however recent studies have shown that even moderate intensity activities including walking and bicycling are associated with reductions in anxiety (Fox, 2009;




Biddle, 1995) along with improvements in mood (Fox, 2009; Biddle et al., 2003), stress reduction (Norris et al., 1991), and cognitive functioning (Cortman and Berchtold, 2002). Cerin et al. (2009) substantiate this argument and further describe that frequent moderate physical activity has been shown to result in a higher degree of psychological wellbeing. More specifically Bray and Kwan (2006) note that increased physical activity during students' transition to college is associated with positive psychological well-being and fewer illnesses than did the students who were not sufficiently active during this time. In summary, the mental health benefits associated with increased physical activity marks the significance of exploration into a proposal that investigates how to craft a design proposal which promotes both mental and physical health.

The potential for suicide is an extremely pertinent area of concern for students during their transition to college as an estimated one in 12 college students have made a suicide plan, and an average of 1,000 students die by suicide on college campuses every year (The American Association of Suicidology, 2007). A recent study concluded that college students that participate in physical activity, especially aerobic exercise (including walking and bicycling), show a significantly lower degree of hopelessness, depression, and suicidal behaviors (Taliaferro et al., 2008). These findings support the exploration of physical activity as a tool to assist in the treatment of depression, which may play a significant part in preventing suicide within the college student population.

Research conducted by Kramer et al. discovered that subjects who participated in an aerobic walking program showed substantial improvement to mental function and specifically the ability to hold attention and switch between tasks (1999). Moreover, a study of 18,000 adult commuters in in eighteen waves of the British Household Panel Survey identified significant associations between overall psychological well-being and walking and cycling to work as well as specifically switching from passive automobile travel to active transportation (Martin et al., 2014). Thus, active transportation presents itself as an effective tool to be used to promote psychological health and overall mental well-being.

Stressors have a substantial influence upon mood, our sense of well-being, behavior, and overall health (Schneiderman et al., 2005). While small to moderate amounts of stressor are normal and even healthy at times, when stress endures long term or becomes recurring, our bodies regularly release stress hormones and mobilize other biological systems. Over extended periods of time, this hormonal overload and imbalance can take a significant toll on the body's physical functionality and impair health (Gabb et al., 2006). Chronic or repetitive stress can impair many bodily systems, including the cardiovascular and the immune systems (Reiche et al., 2004). By dampening the response of the immune system and reducing levels of antibodies, prolonged stress leaves us more vulnerable to the common cold and other more serious diseases (Reiche et al., 2004). Increases in rates of student





sickness translate to increased absences, and potentially lowered academic performance, a dilemma that universities consistently seek to avoid. Other related results of recurring stress include developing high risk lifestyle behaviors such as smoking, alcohol use, and sedentary lifestyle (Lantz et al., 1998). As lack of physical activity has been identified as being significantly correlated to mental health, these moderating effects can become cyclical and compound the negative effects related to both mental and physical health.

## **MENTAL AND PHYSICAL HEALTH WITHIN THE CAMPUS ENVIRONMENT**

Access to natural green space such as longitudinal parks that provides amenities catered towards pedestrians and cyclists has been identified as an indicator of improved mental health and quality of life (Tzoulas et al., 2007). These spaces provide opportunities to engage with nature while participating in physical activity. Several bodies of research have identified that there is significant commonality between the psychological benefits of participation in moderate physical activity and those related to exposure to natural environments including improvements to mood (Hull and Michael, 1995), attentional functioning (Hartig et al., 2003), and overall well-being (Kaplan, 2001).

Based on these relationships it has been identified that participation of physical activity within green or natural environments is particularly beneficial in their relationship with mental health when compared with physical activity in urban

environments (Pretty et al., 2005). In the Pretty et al. study, it was identified that both pleasant natural scenes in the rural and urban environment produce a significantly greater positive effects on mood than a control group not exposed to any natural scenes while engaging in physical activity. Moreover, another study found that walking in a natural environment has been correlated to have significantly better restorative effects than walking in urban surroundings (Hartig et al., 1991).

In another study, researchers exploring responses to the human endocrine system within various environments determined that even 15 minutes spent walking in a forested environment can reduce stress in male college students more than in the city environment (Ming Kuo, 2010). In summation, participation in exercise within green spaces further promotes the already documented benefits of both physical activity and inhabiting natural settings in order to increase overall well-being and recovery from stress. These relationships help ground the thesis of this research in supporting the pursuit of active transportation within a restorative garden-like setting in order to promote increased physical and mental health.





# ACTIVE TRANSPORTATION







# ACTIVE TRANSPORTATION

## ACTIVE TRANSPORTATION FOR PHYSICAL ACTIVITY

Most current studies into the benefits of physical activity as related to physical health do not differentiate the specific type of physical activity, but instead explore the relative intensity of the activity in relation to meeting specific goals. For the purposes of this research, activities which fall into the category of “moderate physical activity” defined by the Center for Disease Control will be investigated. Two of these items, walking (faster than 3 mph) and bicycling (slower than 10 mph) are of increased interest for exploration (CDC, 1999). Active transportation, defined as the transport of oneself using various modes of human power as opposed to some form of motorized or passive transport (de Nazelle et al., 2011) encompasses these two modes of travel.

Associations between regular physical activity and improved physical health have been recognized frequently. In recent years, there has been a noteworthy increase in the exploration of active transportation as a tool to meet physical activity recommendations; leading communities and campuses alike to explore particular planning and policy strategies to increase rates of active transportation among their constituents (Balsas, 2003). For instance, the United States Public Health Service created a national objective to increase the number of walking trips of less than one mile by adults by 50% by the year 2010 (Sallis et al., 2004). This measured increase in public interest and spending related to promoting, active modes of travel marks a substantial change in

priority for decision makers in the 21st century.

There is oftentimes doubt related to the overall benefits of active transportation when weighed against the risks undertaken to engage in active travel due to pollution and traffic conflicts. However, two recent studies have concluded that there are indeed public health benefits to be gained through a modal shift towards active transportation choices, and additionally have identified that the physical activity benefits of active transportation outweigh the risks due to road traffic and potential pollution inhalation (Woodcock et al., 2009; de Hartog et al., 2010). As mentioned previously, physical activity recommendations can be distributed over the course of a day, allowing university students living busy lives to engage in active transportation as they commute to and from campus and move within the campus environment.

The recent trend of suburbanization in both university campuses and American society as a whole has caused people to spend increasing amounts of time in their personal vehicles. This passive transportation over the course of time can prove to be a significant public health issue. In a recent cross-sectional study based on observation of associations between obesity and the built environment, Frank et al. (2004) discovered that every hour an individual spends driving per day was linked with a 6% rise in probability for obesity while every kilometer walked per day was linked to a 5% fall in the probability of obesity (2004). To build on this connection, Giles-Corti et al. (2010) describe a recent study

Figure 2.5 (Preceding Spread) Student Walk At FIU | By Flickr User: Eduardo Merille

in Europe, North America, and Australia which identified an inverse relationship between levels of walking and bicycling and obesity levels. Essentially, as rates of bicycling and walking increased in a given sample, the levels of obesity decreased. Therefore, it can be argued that active transportation is a viable tool to be utilized to reduce obesity levels. This is to be expected as active transportation requires physical activity. Because active transportation has been shown to fall into the CDC's category of moderate or vigorous intensity physical activity, Shepard et al. (2008) suggest that transportation related decisions could potentially modify population-level health in consequence of the reduced risk of obesity associated with active transportation. Undoubtedly, active transportation has become recognized as a viable tool to promote moderate or vigorous intensity physical activity to improve public health.

As approximately 21 million students, or 47% of all Americans between the age of 17-24 are officially enrolled in one of over 6,000 post-secondary institutions (Ginder and Kelly-Reid, 2013; Nelson et al., 2008), the impact of promoting physical activity through active transportation can be far reaching in encouraging increased physical health in a substantial portion of the young adult population. Indeed, Balsas (2003, p. 35) contends that "due to their proactive educational milieu, [universities] are privileged places to communicate sustainability and to help reshape society's transportation patterns." It is important to note that university students currently cycle at much higher rates than the general population

currently, and exhibit much more flexibility towards modal shift from passive to active transportation (Pucher et al., 1999). Moreover, walking and bicycling are complementary forms of transportation to get to and move around within the university campus (Balsas, 2003). The promotion of walking and bicycling on campus will influence many more people that attempting to encourage more traditional forms of physical activity such as sports, aerobics, or weight lifting (Kenney et al., 2005). Students, rather than attempting to seek out leisure time to engage in the recommended 30 minutes of moderate physical activity per day can use their commute to and from campus to achieve these recommendations.

## **BUILT ENVIRONMENT CORRELATES OF ACTIVE TRANSPORTATION**

In the developed world and particularly in the United States, a considerable body of research suggests that the built environment, the part of the physical environment that is constructed by human activity (Saelens and Handy, 2008) is a significant predictor of active transportation (Handy et al., 2002). It is important to note however that while the built environment has been shown to be related to the incidence of active transportation within a given population, there are several other variables which will not be investigated within the bounds of this research including individual and social-behavioral determinants and socio-demographic factors (Butler et al., 2007). It is oftentimes very difficult to clearly define or apply a theory that describes

how infrastructural or environmental alterations promote changes in behavior (Michie, 2008). Ogilvie et al. (2011) describe that this challenge may be related to the fact that most current models describing behavioral changes including the social cognitive theory (Bandura, 1998) and the theory of planned behavior (Ajzen, 1991) do not fully encompass the range of influences that factors of the built environment hold. Owen et al. (2004) further this argument by describing that we currently lack a single adequate model to explain how the built environment influences walking and bicycling behaviors, however the model proposed by Saelens et al. (2003) provides a solid foundational model to begin to describe these environmental influences.

The model, as seen in Figure 2.6, illustrates the linkages between individual, psychosocial, and environmental factors and then proceeds to show how these factors relate to walking and cycling as both transportation and recreation. Its strength also arises from the inclusion of important psychosocial mediating factors along with direct specification of the linkages between the individual, psychosocial, and environmental factors and walking/cycling outcomes. These relationships are not only directly drawn out, but are also weighted based on the strength of the connection, providing further clarity and logic. This ecological model is therefore provides a solid conceptual foundation for use to investigate a designed solution to promote walking and bicycling.

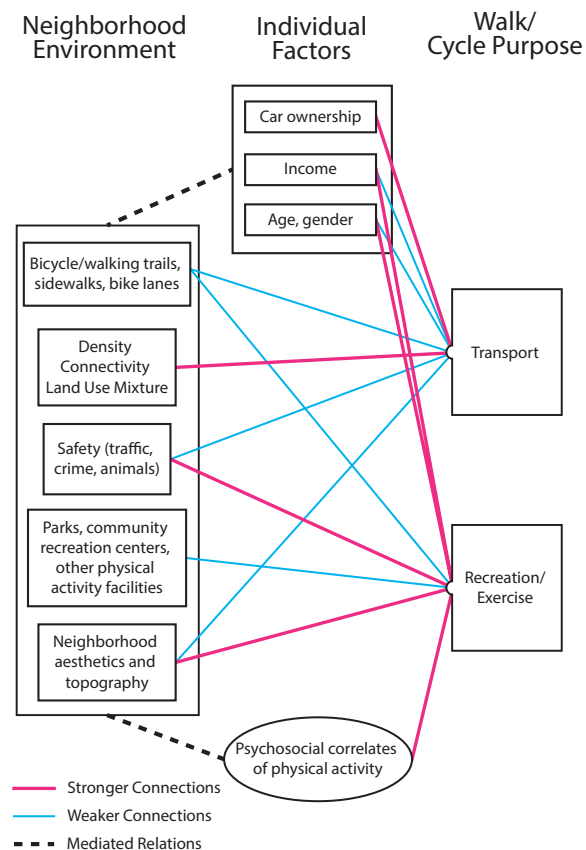


Figure 2.6 Ecological Model Of Neighborhood Environment Influence On Walking And Cycling | Adapted By Author From (Saelens et al., 2003)

Nearly all current research into built environment correlates of physical activity via walking and bicycling has taken place at the city or community design scale and has been based in very similar and traditional city planning measures. Typically, measures of the built environment that have been

thought to influence to active transportation are based in two fundamental ways which land is used: proximity (distance) and connectivity (directness of travel) (Saelens et al., 2003). Proximity is determined by two interrelated factors, density and land use mix. Density refers to the compactness of land uses, and land use mix describes the distance between and intermingling between various land use types. While proximity is based in straight-line distances between various uses, connectivity describes the ease by which one can travel between an origin and a destination utilizing an established street or sidewalk system (Saelens et al., 2003). By increasing density, land use mix, and connectivity, the frequency of walking and cycling within a given community is expected to increase (Saelens et al., 2003; Saelens and Handy, 2008).

Several additional key indicators of motivational readiness to adopt active transportation in college students include travel distance, convenience, time, infrastructure and social support (Cole et al., 2008). By addressing these indicators a planned or designed solution has the potential to make a practical difference in promoting more students in close proximity to the university to take advantage of active commuting modes (Cole et al., 2008). Within the scope of this project, convenience and infrastructure are the two most relevant indicators to explore. A designed change in the built environment cannot alter travel distance or social support; however it can make significant impacts to the availability of infrastructure and the convenience of walking and bicycling as transportation modes.

Neighborhood aesthetics are identified within the ecological model of Saelens et al. (2003) as being positively correlated with recreational and utilitarian bicycling and walking. A stronger connection is identified between aesthetics and recreational walking and bicycling, identifying the importance of providing visual interest to those interested in recreating outdoors. This aesthetic character of the built environment is defined by the presence of attractive and pleasant scenery, calmness, interesting things to look at, and the presence of natural features (Humpel, 2004). Corti (1998) remarks that the presence of trees and greenery as well as adjacent parks and gardens were identified to be important to individuals decision to walk to local destinations.

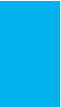
66%

of students surveyed would be more likely/much more likely to walk if streets in the campus core were closed and replaced with aesthetically pleasing pedestrian walkways



(online survey by author, 2015)

Further studies conducted by Tilt et al. (2007) and Van Dyck et al. (2012) describe that individuals who perceived their neighborhood as more aesthetically pleasing and containing more natural features reported expressively higher levels of walking for transportation than those who felt their neighborhood was lacking in natural features. Additional research positively correlates utilitarian and recreational walking



with the aesthetic character of the surrounding environment (Saelens and Handy, 2008; Toor and Havlik, 2004). Lastly, survey results shown on the previous page illustrate that 66% of students at Kansas State University would be more likely or very much more likely to walk to campus and class if vehicular streets within the campus core were closed and replaced with aesthetically pleasing pedestrian focused walkways. Therefore, it can be concluded that by creating a more natural and pleasant environmental experience to travel within the university campus, the modal share of active transportation of those within its neighborhood context will increase.

## **ACTIVE TRANSPORTATION BEHAVIOR ON CAMPUS**

Pedestrians and bicyclists should be the first priority when considering campus design and due the large volumes of pedestrians and bicyclists that exist on most university campuses, special techniques must be utilized to allow safe and efficient movement of these users (Haines et al., 1974). Vehicles, pedestrians, and bicyclists that coexist within the university campus have drastically different spatial needs, travel speeds, and infrastructural requirements, a reality that often leads to significant modal conflict and traffic danger. The redesign of the physical “transportation environment” of a university campus and its surrounding neighborhoods to both slow traffic speeds and isolate modes of travel is the most effective approach to increasing user safety (Havlik and Newman, 1998).

These redesign strategies must be focused on separating vehicles, pedestrians, and cyclists through creation of dedicated, segregated facilities (Haines et al., 1974; Toor and Harvik, 2004; Dober, 1963). This separation of bicycles from vehicles entirely in the form of separated dedicated bicycle lanes and raised on street cycle tracks provides the most ideal environment for bicyclists to inhabit as it eliminates modal conflict and significantly increases safety.

Scott (2014) identifies that substantial conflicts exist between pedestrians and bicyclists at of Kansas State University resulting from unclear bicycle dismount zones and right of way within the core campus. He observed that while advanced cyclists prefer on road bicycle routes to maximize speed, the average and novice campus cyclists generally prefer to be separated from vehicular traffic and will even go as far as riding on a pedestrian sidewalk illegally to achieve this (Scott, 2014). Therefore, another key design consideration when examining shared spaces between pedestrians and bicycles is the presence of a dismount zone policy identifying zones with clear pedestrian priority (Balsas, 2003).

Pikora et al. (2003) define four different types of active transportation: recreational walking, utilitarian walking, recreational cycling, and utilitarian cycling. More importantly, each of these four types is influenced by a unique set of environmental factors and features (Corti, 1998; Pikora et al., 2003). Recognition of the differing needs of utilitarian and recreational walkers and bicyclists is therefore relevant to the design and



planning of a successful system to promote active transportation. Utilitarian walkers and bicyclists have chosen that mode of travel because are generally most interested in getting from a place of origin to a predetermined destination as fast as possible without distractions or delays (Pikora et al., 2003). Speed is of utmost importance to these users and the directness of a route is a large determining factor in their commuting choices. Recreational walkers and bicyclists on the other hand are generally more interested in the aesthetic quality of experience within their transportation environment as well as the perceived safety of that environment (Saelens et al., 2003).

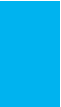
Bicyclists are also classified into four different categories based on skill level, intention, and other preferences by the Department of Transport of the United Kingdom (2008). The different categories of cyclists include fast commuters – those who are confident in most on road situations seeking the most direct routes, utility cyclists – those who may seek segregation at busy junctions and when traveling along high speed routes, inexperienced and/or leisure cyclists – individuals that are willing to sacrifice directness for a less trafficked route and more places to stop and rest, and children – whom should be anticipated in residential areas and generally require off road routes (Department for Transportation, 2008). Consequently, due to the differences in travel behavior between utilitarian and recreational walkers and the several types of bicyclists identified, environments catered to each group's needs should be provided within the university campus through route separation.

## DESIGN FOR ACTIVE TRANSPORTATION

As previously discussed, pedestrians and bicyclists should have priority and clear right of way within the campus environment. Kenney et al. (2005, p. 181) state that there should be “a sense that the automobile is intruding on the pedestrian space rather than the other way around.” A series of interrelated traffic calming techniques can be developed and applied in the campus setting to give pedestrians and bicyclists this priority by slowing vehicles, improving safety, and increasing visibility.

The Project For Public Spaces (2014) describes several relevant strategies to achieve this in their “Traffic Calming Toolbox” including narrowing streets and traffic lanes, widening sidewalks, creating tight corner curbs, installing speed tables, and providing material changes. To provide additional support of the narrowing of streets, recent research identifying trends between street width and safety has recognized that there is little evidence that the safety of a two lane street is enhanced when increasing its width beyond 11 feet (Dumbaugh and Gattis, 2005). Tighter corner curbs within streets force drivers to slow down to navigate their turn which allows increased awareness and reaction time by drivers as well as pedestrians and bicyclists to avoid a collision (PPS, 2014).

Speed tables are similar to traditional speed humps in that they prevent automobiles from comfortably reaching high speeds by creating a modest level change within the travel lane.



However, they also serve as a raised crosswalk by meeting the grade of adjacent sidewalks to provide safe and comfortable crossing for pedestrians (PPS, 2014). Speed tables are especially relevant at mid-block crossings within university campuses as they assist in clearly designating that a vehicle is encroaching on a pedestrian's space. To improve both the safety and visibility of pedestrians in the campus environment, raised pedestrian crossings with different paving materials should be installed so that the automobile recognizes the pedestrian's ownership of the crossing space (Toor and Havlik, 2004).


Research conducted by Nelson and Allen to correlate miles of bicycle pathways per 100,000 residents and the percentage of commuters using bicycles discovered that by building bicycle only lanes and pathways, the modal share of bicyclists can be increased (1997). Several of the cities analyzed by Nelson and Allen were college towns, providing further relevancy for this project. Pucher et al. (2010) and Stinson and Bhat (2003) further this point and explain that several types of bicycle infrastructure including on road bicycle facilities, separated bicycle paths, and two way travel bicycle lanes have shown a positive association to bicycling levels as infrastructure was added. The addition of bicycle infrastructure is only useful however if it provides connection to existing circulation networks and trails as well as local socio-cultural facilities (ULI, 2015).

Careful attention must be paid to major trip generators within a campus environment along with the campus context in order to ensure

suitable placement of infrastructure (Dober, 2000). Infrastructural improvements that allow increased and safer bicycle flow through the campus must also be paired with support infrastructure such as signage, ample bicycle parking, clear intersection right of way treatment, and showering facilities (Balsas, 2003). Public or university transit can also help facilitate active transportation mode choices.

To promote increased ridership of campus transit services and bicycling, bicycle racks should be installed on the campus or commercial fleet that serves the university (Toor and Havlick, 2004). This allows students who may live several miles away from campus to bicycle to the bus stop and upon arrival to campus, access classes and perform other errands without requiring parking. Lastly, a bicycle sharing program populated with lost, stolen, or abandoned bicycles that have been repaired and painted one color can be rented out short term to provide easier daily, weekly, or semester long access for those who may not be able to afford the cost of a bicycle (Toor and Harvik, 2003).

In a review of literature related to built environment correlates of walking, Saelens and Handy (2008) identify that the most consistent set of conclusions related to proximity to one's destination. Essentially, as the distance between destination and starting place increases, the likelihood of walking decreases. The second measure discussed by the authors relates to density in that as density increases, the likelihood of walking behaviors does as well. The authors



point out however that this is most likely related to proximity because with increased density, destinations are often closer together. By increasing the aesthetic value of a circulation space, the amount of walking which occurs in that space is expected to increase. Toor and Havlik (2004) also comment that conflicts with motorists discourage many pedestrians from utilizing walking as a transport choice more often.

To further this point, Balsas (2003) explains that walking on campus is affected by safety concerns at intersections where the most modal conflict and confusion related to right of way occurs. By removing conflict points between vehicular and pedestrian traffic, safety perception and subsequently walking modal shares will potentially increase. The removal of vehicular access within a campus environment provides a unique opportunity to explore removal of these conflict points (KSU, 1968).

Along with safety, comfort is a key characteristic which can encourage more walking. By widening sidewalks, more users can comfortably circulate through the campus and pass others without vacating the sidewalk. Wider sidewalks also allow increased affordances for pairs and groups of walkers to walk next to each other and converse without disrupting other users, thereby providing social support, a key measure for increased active travel in university students (Cole et al., 2008). Comfort generally covers site features to provide protection from the weather, ample illumination at nighttime, aesthetic visual appearance, and functional amenities. The ULI

(2015) identifies that street amenities such as bike racks, street lamps, public art, benches, and street trees make sidewalks more appealing spaces to pedestrians. Increasing street furniture within the university campus environment is important as many students, faculty, and staff will have increased affordances for impromptu meetings, lingering, and studying within the campus, a key determinant in facilitating a campus community (Kenney et al., 2005).



A photograph of a grassy hill with a stone staircase leading up to a line of trees under a cloudy sky. The text 'RESTORATIVE LANDSCAPES' is overlaid in large, white, sans-serif capital letters on the left side of the image.

# RESTORATIVE LANDSCAPES







# RESTORATIVE LANDSCAPES

## WHY NATURE?

For the purposes of this research, nature is defined as a predominantly organic setting within which a ecosystem services and processes are present (Ulrich, 1999). Nature is made up of natural elements such as plants, animals, soil, water, or air and is highly dependent on the relationships and flows of energy between these elements. It also encompasses a wide variety of environments ranging from wilderness preserves to urban parks and even gardens. In nearly all cultures, both past and present, a deep affection for nature is apparent (Cooper Marcus and Barnes, 1999). This affection, seen across the globe, allows designers to apply natural elements within the built environment to evoke positive responses from a wide variety of users. Bruce (2013) explains that humanity should recognize that we are intrinsically a part of nature, rather than a foreign body intruding within the natural environment. This recognition of our place within the natural world allows individuals within natural settings to feel connection to something bigger than ourselves. The great, ancient civilizations of China and Egypt recognized this connection to nature and meticulously sought out ways to incorporate connections to nature within the urban environment (Ulrich, 1995).

## BIOPHILIA

The hypothesis that humans have an inherent desire to associate with nature has been referred to as biophilia. Heerwagen (2009, p. 39) describes that contact with nature is “not a cultural amenity,

not a cultural preference, but a universal primary need.” This instinctive bond between humans, nature, and other forms of life serves as the foundation for the restorative benefits that natural settings provide to humans. The theory of biophilia was originally developed within the field of environmental psychology by EO Wilson in 1984. In recent years, architects, urban designers, and landscape architects have begun to apply the principles of biophilia within their own work to facilitate connections between man and nature. Heerwagen (2009, p. 53) describes that the goal of biophilic design is to “create places imbued with positive emotional experiences — enjoyment, pleasure, interest, fascination, and wonder — that are the precursors of human attachment to and caring for place.”

To create biophilic design, a space may explore and apply “inspiration from both the local natural environment and vernacular cultural expressions for creating a sense of place” (Heerwagen, 2009, p. 42). By doing so, interaction with designed natural settings will prove constructive to all demographics, regardless of culture, age, or gender. In order to evoke positive emotional responses from users of restorative spaces, designers must understand how the experience of place is interpreted by the users of that place (Cooper Marcus and Barnes, 1999).

The biophilia theory essentially suggests that humans, through much of our evolution and cultural development, have been embedded within a natural landscape of some sort. The importance of the natural relationships between

Figure 2.7 (*Preceding Spread*) Expressive Approach To  
Meditative Garden at Skogskyrkogården | By Author

man and nature are seemingly ingrained in our development through time (Grinde and Patil, 2009). As society has progressed however, the landscapes we inhabit have become more and more manmade and devoid of nature, leading some to speculate that there is a societal “mismatch” involving differences “between present living conditions and the environment of evolutionary adaptation.” Additionally, environments devoid of nature may act as a “discord” which effectively describes a mismatch between our instincts and environment “with a potentially undesirable impact on health or quality of life” (Grinde and Patil, 2009).

The term Environment of Evolutionary Adaption (EEA) describes the condition of the environment in which humans are adapted to live (Crawford and Krebs, 1997). Grinde and Patil remark that this EEA involved a much closer presence of nature than the environments most people live within and experience in the 21st century (2009). Furthermore, the human brain in many ways appears to be especially susceptible to this discord due to its complexity and maturation in response to environmental stimuli. This susceptibility aids in explaining why mental disorders are one of the main problems in Western society as trends increasingly turn towards urbanization and sprawl (Grinde, 2009). Overall, it is expected that closer association with natural environments, an important setting of our EEA will improve psychological health (Grinde and Patil, 2009).

While these expectations and assumptions related to the restorative and healing potential of both

designed and wild natural environments have existed for centuries across the planet, only in recent years have researchers been able to substantiate the arguments with evidence.

## **THE RESTORATIVE BENEFITS OF NATURE**

In the context of this research, restoration refers to “the process of renewing physical, psychological and social capabilities diminished in ongoing efforts to meet adaptive demands” (Hartig, 2004, p. 2). A restorative environment must provide some distinct contrast with another relatively demanding environment in order to successfully incite change within its inhabitants. Decades of experiential research has been conducted to corroborate the beneficial effects of human interaction with natural settings. Roger Ulrich, a Professor of Architecture at the Center for Healthcare Building Research at Chalmers University of Technology in Sweden performed a study based on interviews with hospital patients, and identified that 95% of individuals interviewed reported a positive mood change as a result of spending time outside (Ulrich, 1999). Nature has been proven to have provide significant benefits to human well-being, and more importantly historical research submits that natural scenes including vegetation, water, and wildlife has been culturally associated with stress relief and relaxation (Gerlach-Spriggs et al., 2004).

A particularly relevant study undertaken by Clare Cooper Marcus and Marni Barnes (1999) questioned where college students prefer to be when stress out. They found that 71% of the

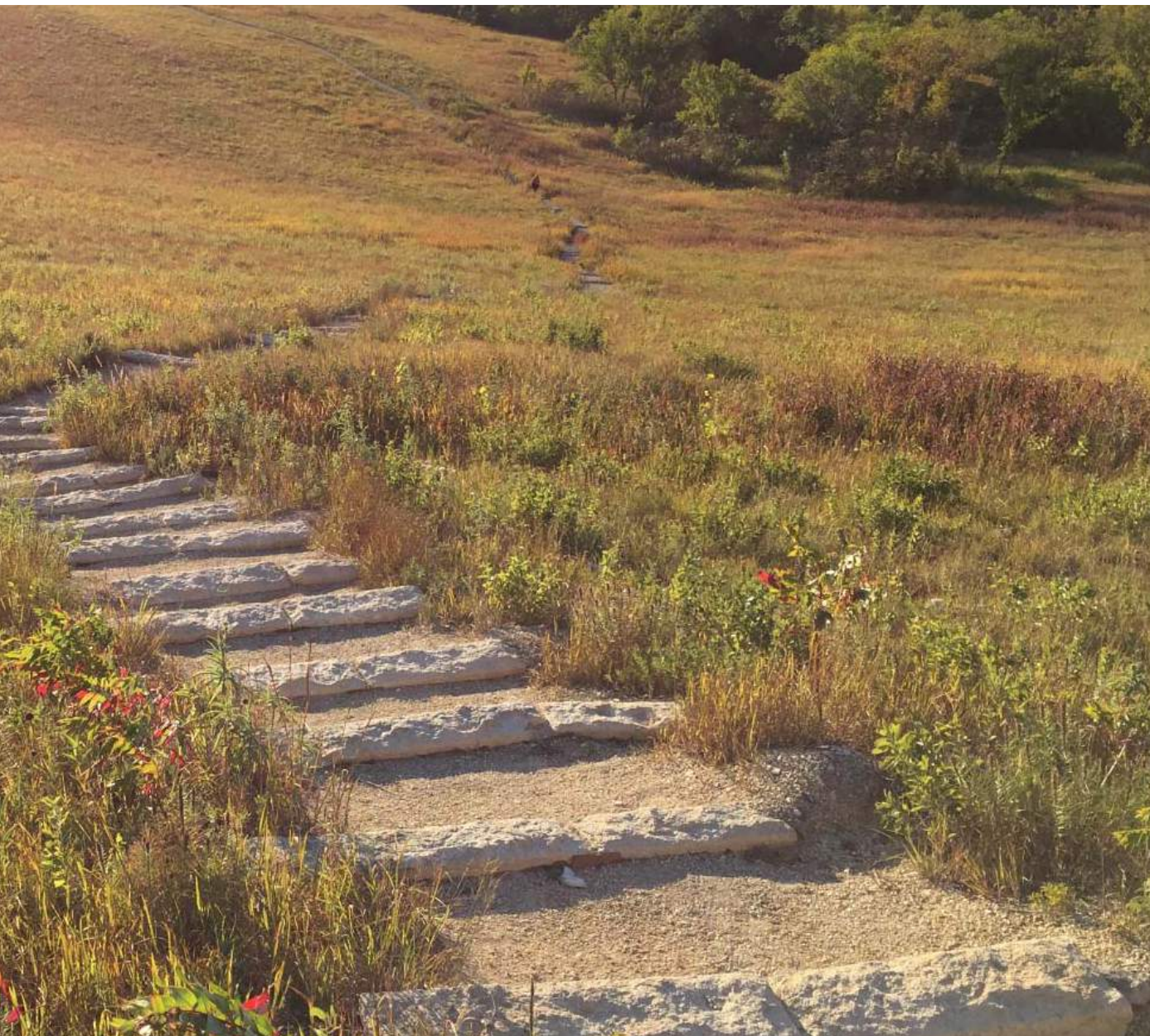
students interviewed preferred natural settings to urban environments (Cooper Marcus and Barnes, 1999). As university students are oftentimes very stressed out during their transition to adulthood, the design of natural spaces within university campuses to emerge as a unique opportunity to relieve stress. Another study conducted by Ulrich found that patients who had access to a natural view of a garden after undergoing gallbladder surgery recovered faster, received better evaluations from nurses, and required fewer painkillers than those viewing an urban scene who had undergone the same procedure (1984). Furthermore, People with less access to nature are more prone to stress and anxiety, as reflected not only individuals' self-report, but also measures of pulse rate, blood pressure, and stress-related patterns of nervous system and endocrine system anxiety, as well as physician-diagnosed anxiety disorders (Ming Kuo, 2010, p. 4). These findings help explain why people in many western societies seek a form of escape through vacationing in largely natural settings.

Evidence from empirical, theoretical, and anecdotal research has also validated that interaction with nature or natural environments positively impacts blood pressure, cholesterol, outlook on life, and stress reduction (Maller et al., 2006). Lastly, a study conducted on the relationship of nature and one's cognition within a natural setting discovered that experiencing nature can strengthen the activities taking place within the right hemisphere of the brain while also restoring harmony to the overall functions of the brain (Furnass, 1979). This provides opportunities




Figure 2.8 Trail At Konza Prairie Provides Public Access To Nature | By Author









for increased academic learning. Overall, review of many relevant sources has shown that a vast pool of literature exists connecting nature to qualities that restore mental fatigue and eliminate stress, thus reducing potential mental health issues (van Praag, 2005).

## **THEORETICAL BASE OF RESTORATION**

Several theoretical frameworks which specifically influence and describe the restoration experience have been identified in the literature to describe why humans inherently require restorative experiences to remain functional, and provide evidence related to how nature can achieve this restoration. The theories and empirical findings discussed within this section further submit that nature and natural settings play an significant part in positively influencing human mental health and well-being.

Seminal research conducted by well-known psychologist Stephen Kaplan lays groundwork to understand the importance of directed attention from a functional standpoint. Attention Restoration Theory (A.R.T.) further examines the effects of interchange of information between humans and their surrounding environment. Kaplan (1995) describes that attention can be described as either voluntary or involuntary. The involuntary attention is essentially effortless engagement of the mind, and cannot be used to make decisions. In contrast, directed attention, the voluntary attention humans afford to their surroundings, is a task which requires input and effort and is fundamentally important in

achieving focus. Directed attention remains under voluntary control of the individual and allows the mind to comprehend relationships between stimuli to “deal with situations in which appropriate action may not be immediately obvious” (Kaplan, 1995, p. 171).

These processes occurring in one’s brain are required to generate any sort of action or choice, and in stressful situations will lead to exhaustion. Any prolonged mental effort will lead to directed attention fatigue, which is a “key ingredient in ineffectiveness and human error” (Kaplan, 1995, p. 172). Directed attention is quite fragile as it is susceptible to fatigue over extended periods of time. If this facet of mental functioning is lacking in any way, the perception of the individual will be effected, potentially resulting in increased susceptibility to distractions and reduced perception of tedious material. The oftentimes tedious schoolwork completed by students can compound this directed attention fatigue, leading to further stress and ineffectiveness.

Upon failure or overuse of directed attention, irritable emotions may arise which leads the individual to avoid contact with others around them. This avoidance of others along with general socialization is in strong distinction to the tendencies of other emotions induced by stress such as anxiety, where typically causes the sufferer to seek out others for comfort (Kaplan, 1995). As mentioned previously, the built environment can also have significant impacts on an individuals’ stress. The restorative experience further described by Kaplan (1995) then explains

that to counteract the psychological, social, and physical capacities diminished in ongoing efforts to meet adaptive demands, one should seek an escape from the perils of directed attention fatigue to bring oneself back to a state of effectiveness. This experience of escape must provide a means by which directed attention would temporarily become unnecessary by providing stimuli to initiate one's effort free involuntary attention.

Research conducted over the last several decades by Kaplan identifies several principles that have been identified to be fundamental in creating a restorative landscape. According to A.R.T. the restorative quality of an environment is determined by four main components which facilitate mental recovery from directed attention fatigue: being away, extent, compatibility, and fascination (Kaplan, 1995). The last, fascination, is considered most essential in that an environmental stimulus must have some sort of fascinating qualities to attract one's involuntary attention. Kaplan differentiates the hard fascination of watching auto racing and soft fascination associated with walking in a natural setting and explains that soft fascination is more relevant to restoration (Kaplan, 1995). The importance of a sensory engaging experience in stress reduction is foundational to Kaplan's description of restorative environments.

Being away refers to the environmental characteristics which allow a temporary escape from the daily rigors, hassles, and obligations of life. Being away doesn't require extreme physical separation from one's everyday environment,

but instead relies on allowing a measured shift from the taxing directed attention to a more calm involuntary attention. This creation of a setting which is "away" can be done simply through framing of views to reach a conceptual rather than physical transformation (Kaplan, 1995).

Extent describes that highly restorative settings must be "rich enough and coherent enough so that it constitutes a whole other world" (Kaplan, 1995, p. 173). To provide this spatial extent, the landscape doesn't necessarily need to be vast, but rather must allow "enough to see, experience, and think about so that it takes up a substantial portion of the available room in one's head" (Kaplan, 1995, p. 173). It relies on the concept of being a part of a greater whole within the landscape.

Lastly, compatibility refers to a meeting place of the physical environment and "what one is trying to do and what one would like to do" (Kaplan, 1995, p. 173). A built environment should provide affordances to accomplish the needs and desires of those within it. By limiting the requirements of a landscape to draw on users' directed attention, this compatibility can be achieved. When a balance of all of these components work together within a given environment, attention restoration and subsequent stress reduction will be maximized. Natural settings therefore have irrefutable restorative effects on individuals who may be suffering from directed attention fatigue because of their ability to simultaneously convey perception of these four principles (Kaplan, 1995). Humans are inherently "drawn to the mystery, security, beauty, comfort, and promise

of tomorrow that these special places provide” (Bruce, 2013, p. 5).

An alternative theory proposed by Ulrich (1983) emphasizes the physiological and emotional changes that occur in an individual while viewing a scene after a situation involving challenge or threat. He proposed that if a viewer is stressed out and has excessive arousal, an engaging natural scene may evoke feelings of mild to moderate interest and calmness while lowering arousal levels and inhibiting stressful thoughts. Ulrich suggests that moderate depth, moderate complexity, the presence of a focal point, gross structural qualities, and natural features such as vegetation and water will evoke positive emotions and restrict negative thoughts by sustaining the effortless voluntary attention discussed previously (1983). The theory is based largely on the evolutionary qualities instilled in humans discussed earlier in this section that allow humans to become biologically prepared to respond in a positive manner to environmental factors related to survival.

Modern humans retain this predisposition of innate connection to natural settings, but have developed no such temperament towards most built environments (Ulrich, 1999). Esteemed landscape architect Frederick Law Olmsted recognized this phenomenon of attention fatigue as well, and consciously applied it through his writing and design in order to provide city dwellers with a natural appearing escape from the chaotic urban environment (Olmsted, 1865).

Environmental psychologists Rachel and Stephen Kaplan along with landscape architect Robert Ryan describe that the human perception of the environment provides a constant flow of information (1998). They further comment that humans are addicted to information, and constant crave and seek it out. Within the built environment, much of the information is related to objects and things placed within a setting. However, these places “entail more than their contents” (Kaplan et al., 1998, p. 9) as the information stored within an environment is acquired not only through an understanding of the things within it, but also through the organization of these elements.

When individuals encounter any environment, Rachel and Stephen Kaplan (1998) describe that there is an inherent need to identify one’s place or “fit” within the setting. When an individual cannot understand their environment, they will become distressed. This understanding is only the first step as people inherently want to explore their surroundings to discover what lies ahead. As a result of this, Kaplan et al. (1998) created the understanding-and-exploration framework. This framework is constructed of four informational factors that are grounded in the immediate perception of objects’ number, grouping, and placement within a scene. The observation of these four related factors occurs within seconds of observing a scene. Coherence and legibility, as seen in Table 2.1, are related to understanding a space while complexity and mystery add intrigue and suggest further exploration. These factors are described as follows:

Understanding	Exploration
COHERENCE	COMPLEXITY
LEGIBILITY	MYSTERY

Table 2.1 Landscape Preference Matrix | Adapted from (Kaplan et al., 1998)

**Coherence:** The amount of organization and order that a scene contains. The environment is unified through repeating themes and therefore readily perceived.

**Complexity:** The setting contains a richness of elements and appears very intricate. It therefore provides many intriguing visual components for consideration to promote exploration.

**Legibility:** A scene must be extremely distinct through provision of memorable components to assist in wayfinding and orientation. An individual can easily navigate the space with assistance of a landmark.

**Mystery:** The environment must provide some promise that it keeps going by suggesting that there is more to see. Meandering paths and obstruction of views are two ways to accomplish this.


The combination and weighted balance of these four informational factors can be utilized to drastically increase user comfort within a landscape. As user comfort is a key determinant in the design of restorative landscapes, this framework can be applied to a future design solution.

Esteemed geographer Jay Appleton's theory of environmental aesthetics, commonly referred to as prospect-refuge theory, is grounded in an adaptive-evolutionary standpoint. The theory describes that human preference within both art and landscapes is based on inherent evolutionary perceptions of what environments are needed for survival (Appleton, 1975). Humans, despite not being hunter gatherers any longer, still maintain positive responses to environments and features which would have enabled the survival of their ancestors. The ability to see with an unobstructed view (prospect) from a safe vantage point without being seen (refuge) without potential danger (hazard) is the most comfortable and analogous to what our ancestors would have preferred to survive (Appleton, 1975). This hypothesis has been validated with research across many different cultures and contexts, and is foundational to understand in order to create spaces that make people comfortable by responding to these evolutionary preferences. Cooper Marcus and Sachs (2014) remark that people who feel ill, fatigued, or stressed will tend to seek environments with a higher percentage of refuge. In a restorative garden these principles of security can be achieved by providing ample protection at a user's back while allowing a clear, unobstructed view forward into an adjacent space.

## RESTORATIVE DESIGN CONSIDERATIONS

Whether one's exposure to nature happens within a garden, park, or a more natural environment, Kuo (2010) describes that it has significant effects on enhancing psychological health. The





previously identification that changes to the built environment sets the stage for exploration into considerations related to the creation of a restorative space. Restorative gardens and landscapes are designed and implemented with the intention of providing some level of “healing” through human interaction with the space either through viewing or active spatial engagement. Within a healthcare setting, Cooper Marcus and Barnes (1999) describe three general types of healing including: “relief from physical symptoms or awareness of those symptoms,” “stress reduction,” and “improvement in the overall sense of well-being”. Outside of the healthcare setting, restorative landscapes typically focus their efforts towards stress reduction and improving user’s overall sense of well-being. The capability of a built environment to have healing properties is based in large part on their effectiveness in facilitating stress reduction and restoration. Ulrich (1999) describes four stress coping mechanisms which allow a garden to convey a sense of security including fostering a sense of control, physical movement and exercise, access to nature and other positive distractions, and lastly social support.

A sense of control is identified to be an important factor affecting a person’s ability to cope with stressful situations. In order for a garden to foster restoration through a sense of control, users must be able to find their way through the environment without any difficulty and be able to use the garden in an active and/or passive manner (Ulrich, 1999). Design strategies the garden can undertake to promote control

include providing spaces which allow users privacy, providing a variety of spatial types, making choices possible within the landscape, and lastly facilitating way-finding signage. This sense of control can be manifest by allowing users of space to make choices related to the pace and procession of their experience as they move through a landscape (Bruce, 2013). Spaces which allow and encourage these individual choices within the landscape empower the user to become more actively involved in their own restoration process, further promoting the stress reducing qualities of the space. The level of control and choice one has within a space is also directly tied to the ability of a space to transform and adapt to a variety of user’s needs. Multi-use spaces with moveable seating elements and other adaptable design features can be shaped both physically and through one’s imagination (Heerwagen, 2009), and facilitate physical and psychological activity within a space. The overall intent of these decisions is to provide comfortable settings which are spatially grouped and clearly linked visually (Cooper Marcus and Barnes, 1999).

In regards to physical movement and exercise, Ulrich remarks that physical exercise has been found to improve psychological well-being and more specifically, depression and anxiety (Ulrich, 1999). As discussed in the physical and mental health subchapter, a significant moderating effect between physical activity and mental health exists. Stress relief and increased overall mental health can be incorporated through this moderator within a restorative landscape by providing design features that promote physical activity.

Design recommendations for exercise involve providing walking loops within the garden to allow active exploration on foot and providing visually enticing objects to draw users through the spatial sequence of the space (Ulrich, 1999). It is important however to note that the promotion of physical activity within the landscape should not come at the expense of the restoration experience.

Natural distractions tie directly into A.R.T. and other theoretical underpinnings related to biophilia discussed in the preceding section and involves stress reduction through viewing of natural scenes. Ulrich (1986) notes that positive distractions, for instance those found in nature, may block or diminish worrisome thoughts, and foster beneficial changes in physiological systems such as lowered blood pressure and stress hormones. These distractions can be provided through planting multi-sensory vegetation, providing relaxing water features, and utilizing natural materials. Gardens will be inclined to ameliorate stress effectively if they contain verdant foliage, flowers, non-turbulent water, park-like qualities (grassy spaces with scattered trees), nature sounds such as birds, breezes, and water, and offer views to wildlife (Ulrich, 1999). Relf further describes that the incorporation of vegetation into the built environment is the most cost effective way to alter the negative perceptions and opinions of a space (2003).

Social support, referring to perceived emotional support or caring that a person receives from others, suggests that social contact will tend to “ameliorate stress and benefit user health” (Ulrich,


1999, p. 45). Design considerations related to promoting social support include creating a spatially enclosed setting for active socializing, creating spatially open settings for more passive activities such as viewing nature and people watching, and avoiding design approaches which promote social interaction to the extent that access to privacy is lost (Ulrich, 1999). Although an individual experiencing stress will respond in a unique and personal way, it is crucial that a restorative landscape provide a setting that promotes social support.

Within a community environment, Relf explains that social support can be defined as the “group of people living in close proximity and sharing similar interests and values” (2003). In further support of this mechanism, Epstein et al. describe that environments that function as restorative landscapes to alleviate stress can “create positive interaction through activities, social groupings and relationships to outdoor environments” (1999). Within a restorative garden setting, the landscaped features, spatial subdivisions, and opportunities for interaction such as benches, seating nooks, and plazas provide affordances for socializing, sharing values, and mitigating stress (Ulrich, 1999).

Cooper Marcus and Barnes (1999) identify six major determinants to be provided within restorative landscapes. They report that the landscape should:

**Have A Variety Of Subspaces:**

Spaces for both group and individual use give



users choices to provide a sense of control. Specific zones or tucked away spaces for solidarity allows users to get away from their surroundings.

**Provide A Prevalence Of Green Material:**

By minimizing the hardscape coverage and allowing plant material to rule the garden, soft fascination can occur to improve stress relief and overall wellness.

**Encourage Exercise:**

Movement through the landscape will promote both mental and physical health based on the moderator effect described previously.

**Provide Positive Distractions:**

Water features, pleasant wildlife attracting vegetation, and sensory engaging plant material all provide positive distractions to ease stressed individuals' minds.

**Minimize Intrusions:**

Urban noise, smoke, heavy wind, chaotic activity, and harsh artificial lighting should be mitigated through design features such as hedges, walls, and careful spatial programming.

**Minimize Ambiguity:**

Settings that are too mysterious and abstract can provide interest to stress free users, but potentially counterproductive for ill or stressed users. Abstract art should be avoided to prevent misinterpretation.

In addition to these recommendations, Cooper Marcus describes several more considerations

to be made if the garden is to be used and reach its full potential (Cooper Marcus, 2007). The set of recommendations is grounded in the “author’s observation of more than one hundred hospital gardens in four countries” and involves several different themes that those previously discussed (Cooper Marcus, 2007, p. 6). The design considerations include visibility, accessibility, familiarity, quiet, comfort, unambiguously positive art, archetypal spaces, design metaphors, and regional attributes. Visibility entails both provision of signage to make potential users aware of a space, and placing a restorative landscape in an environment where it will be highly visible to potential users. The garden should be accessible to all users whether they be blind, in a wheelchair, or easily fatigued. The entirety of the garden should therefore be ADA accessible (Cooper Marcus, 2007).

Familiarity is based in creating a human scale landscape that has an aesthetic ingrained in the culture of the majority of users. The space must also be quiet, calm, and in contrast to the surrounding atmosphere by eliminating mechanical sounds and street traffic (Cooper Marcus, 2007). Comfort can be attended to by creating a space that feels safe, has some sense of enclosure, and avoids users feeling like they’re in a fishbowl being watched by others. The space should be comfortable enough for users to lie down and take a nap without feeling insecure. Additionally, physiological comfort must be provided through choice in seating in the sun and shade, seating protected from breezes, and benches to allow an individual to lay down.

Stressed out individuals often project their stress onto nearby objects and people (Cooper Marcus, 2007). Niedenthal et al. (1994) describe the concept of “emotional congruence” which describes how the emotional state of the viewer will define which environmental stimuli will be the center of attention. This concept and subsequent research leads Ulrich (1999) to the conclusion that abstract art has the potential to be comprehended as threatening or terrifying to an anxious or stressed individual. Unambiguously positive art encompasses representation of natural elements and landscape subject matter (Cooper Marcus, 2007).


Archetypal spaces provide an opportunity to connect with nearly all individuals, regardless of cultural background, socioeconomic status, and personal interests. An archetype, as a recurring spatial theme or motif from the design sense allows increased sense of connection to users when applied to a restorative landscape. Metaphors are often used in design to instill deeper meaning into a space. For instance, a common theme in restorative landscape settings involves the cycle of life as portrayed through a dynamic sequence of spaces and water features. Lastly, the landscape should draw upon locally sourced vegetation and materials to provide a connection to the local context. By creating a context sensitive solution, the design can educate visitors about the region while providing familiarity to those who live nearby.

## **APPROACHES TO RESTORATIVE LANDSCAPE DESIGN**

As with any type of design, there are several different methods or approaches to the design of restorative spaces. These approaches give priority to various design related factors in order to reach the same end goal of stress relief, restoration, and an increased sense of overall wellbeing. Cooper Marcus and Barnes describe that in creating a space for healing and restoration, designed must create an interface between two objectives, “creating a place and facilitating a process” (1999, p. 87). The processes involved in healing and restoration are complex and by no means fully understood, but the basic shifts in attitude that take place when a user is stressed can be utilized to develop design a design philosophy. They then carry on to describe three distinct approaches to the design of landscaped spaces meant to provide healing and restoration. These approaches include the traditional approach, the botanical/ecological approach, and the people-oriented approach (Cooper Marcus and Barnes, 1999).

The traditional approach to the design of restorative landscapes is focused on the analysis of historical precedents and application of regional characteristics and art. The historical precedents look to existing built works shown to provide healing benefits for users such as Japanese zen and tea gardens, the labyrinth, and the monastic cloister garden discussed previously. As these historical precedents are used as frameworks to inform many other designs and imbued with their own power, they can be described as “cultural





archetypes for healing and restoration” (Cooper Marcus and Barnes, 1999, p. 97). By applying the regional attributes of a place to a designed setting, a sense of identity can be created for an organization or institution. This respect to the region also creates a strong cohesion and connection with the surroundings. Additionally, by using regional elements, familiarity is embedded within the landscape to allow increased compatibility (Kaplan, 1995). Statement art pieces allow a message to be conveyed to users of a space and abstraction is used as a tool to provide to narrate this statement. This presents potential risks however as a wide range of interpretations from stressed individuals can arise from statement art as its form becomes increasingly abstracted (Cooper Marcus and Barnes, 1999).

The botanical/ecological approach derives its purpose from the use of medicinal plants and vegetation which has been chosen due to its sustainable qualities. These sustainable qualities are difficult to define and may range from the use of native plants to permaculture and organic maintenance practices. However, the overall intent of this approach is clear and is based in the creation of “an ecosystem within the built environment that is in harmony with nature’s own support systems” (Cooper Marcus and Barnes, 1999, p. 101). This approach is grounded in the belief that immersion in an environment which promotes the health of all living things will allow an individual to relax and become restored to a higher degree. Additionally, the concept of horticultural therapy, described as gardening used to improve a human’s psychological

health has become a notable treatment for psychiatric patients and individuals suffering from anxiety and depression disorders (Dixon and Aldous, 2014). The therapeutic benefits of guided gardening experiences have been well documented and provide opportunities for programmed activities within a public or privately owned garden. Oftentimes educational goals are tied into gardens designed with this approach by labeling plants which have been used in medication and drugs to “demystify” them to users (Cooper Marcus and Barnes, 1999).

The people-oriented approach to restorative garden design is based primarily in understanding and fostering the connections and interactions between humans and their environment. (Cooper Marcus and Barnes, 1999). Findings based on personal experiences, empirical research, and clinical practice are synthesized and applied to a space in order to allow a deeper and more personally relevant connection to a space. Understanding and applying principles of environmental psychology related to the human experience within space and providing linkages between emotion and environment allow these spaces to respond to human needs (Cooper Marcus and Barnes, 1999). The human needs catered to within this approach will transcend demographics and allow a space to be meaningful to all users by allocating substantial amounts of time to consideration of the experience of a user as they progress through a prescribed spatial sequence.



Figure 2.9 Exposure To Nature Provides Restoration | By Jack DeVault



# CAMPUS STREET CLOSURE CASE STUDIES

## ANALYSIS RATIONALE

Through extended research, literature review, and discussions with several members of the Society for College and University Planning (SCUP), the closure of campus streets were identified as a suitable solution to improve pedestrian safety and accessibility within the university campus. Every crosswalk along a campus street, signalized or otherwise, represents a potential conflict zone between transportation modes. By creating pedestrian boulevards and malls in the place of vehicular streets, these conflicts are eliminated and the campus environment is able to more appropriately respond to the human scale. As both actual and perceived safety are key determinant in an individual's choice to walk or bicycle (Saelens et al., 2003), the removal of potential vehicular conflicts through these street closures provides a unique opportunity to increase student participation in active transportation modes. Lastly, the conversion of a campus street corridor allows exploration of specific programming and design considerations to create a meaningful experience to mitigate student stress.

## OBJECTIVES OF CASE STUDY ANALYSIS

By studying several well executed examples of campus street closures, this analysis identifies specific programming and design strategies that create a strong sense of place, promote opportunities for social interaction, and facilitate pedestrian circulation. While each case responds to several unique opportunities and constraints

within their unique context, there are many similar circulation demands within university campuses across the nation. Key takeaways are described within each individual case, and then followed with a spread that summarizes overall findings related to programmatic elements and design considerations found within the cases. Trends in the presence of these factors within all three cases are then identified to determine which factors are most suitable for application within a design framework to create human scaled, aesthetically pleasing, and social circulation corridors within the campus.

## SELECTION RATIONALE

The first requirement for selection of cases involved confirmation that the designed space formerly served a infrastructural role for vehicles/streetcars. Secondly, the cases had to meet a certain level of subjective aesthetic appeal defined by the author in order to filter out more engineered and less “designed” projects. Cases were also selected to illustrate design solutions at universities of various sizes, within different parts of campus, and of different scales. This allows the findings extracted from these cases to remain more relevant to the wide range of university campuses across the United States. Lastly, selection was also influenced by access to project descriptions, digital photographs, and willingness of firms/photographers for their work to be shared. Overall, these cases provide a strong foundation for understanding how street conversion can be used as a tool to promote walking while also creating a cohesive campus.

Figure 2.10 The University of St. Thomas Student Life Mall | By TBG Partners (used with permission)







# UNIVERSITY OF CHICAGO 58TH STREET:

<b>FIRM:</b>	Site Design Group LLC
<b>LOCATION:</b>	Chicago, IL   University of Chicago
<b>SIZE:</b>	1.10 Acres
<b>CONTEXT:</b>	The project is within the heart of an urban university campus on axis with the main quadrangle of the university.
<b>USERS:</b>	The improvements cater to the student body and staff of the university, but also provide increased walkability for the surrounding community
<b>DILEMMA:</b>	A two way street with parallel parking disrupted the flows of pedestrians between the biological and physical science campuses.
<b>GOALS:</b>	To create a pedestrian spine acting as an extension of the University's main quadrangle to unite the two disjointed campuses. Additionally, the design solution provides several areas for gathering and socialization that would have previously been dedicated to storage and movement of vehicles.
<b>PROGRAM ELEMENTS:</b>	Benches, pedestrian scale site lighting, bicycle storage, tables, space defining paving pattern, trees, showy plant material, pedestrian only path
<b>DESIGN CONCEPT:</b>	The concept was to create a new gateway to the campus which acts as a pedestrian spine, thereby reinforcing the university's ability to facilitate street life. Detailing and materiality create a beautiful, connective experience.

## TAKEAWAYS:

This project powerfully illustrates the clarity that a well connective space can introduce into the campus environment. More socialization and activity has been observed by providing a legible, human scale circulation path. Pedestrian lighting makes the space feel very safe at night and further emphasizes the human scale of the space. Materiality choices on the ground plane clearly identify ownership of space and break the scale of the walking space down further. Intimate seating nooks have been defined by planting areas, and allow access to a semi-public space to escape the oftentimes busy walkway.



Figure 2.11 Paving Pattern Demarcates Space



Figure 2.12 Bike Racks Increase Accessibility



Figure 2.13 Site Plan Illustrates Project Clarity

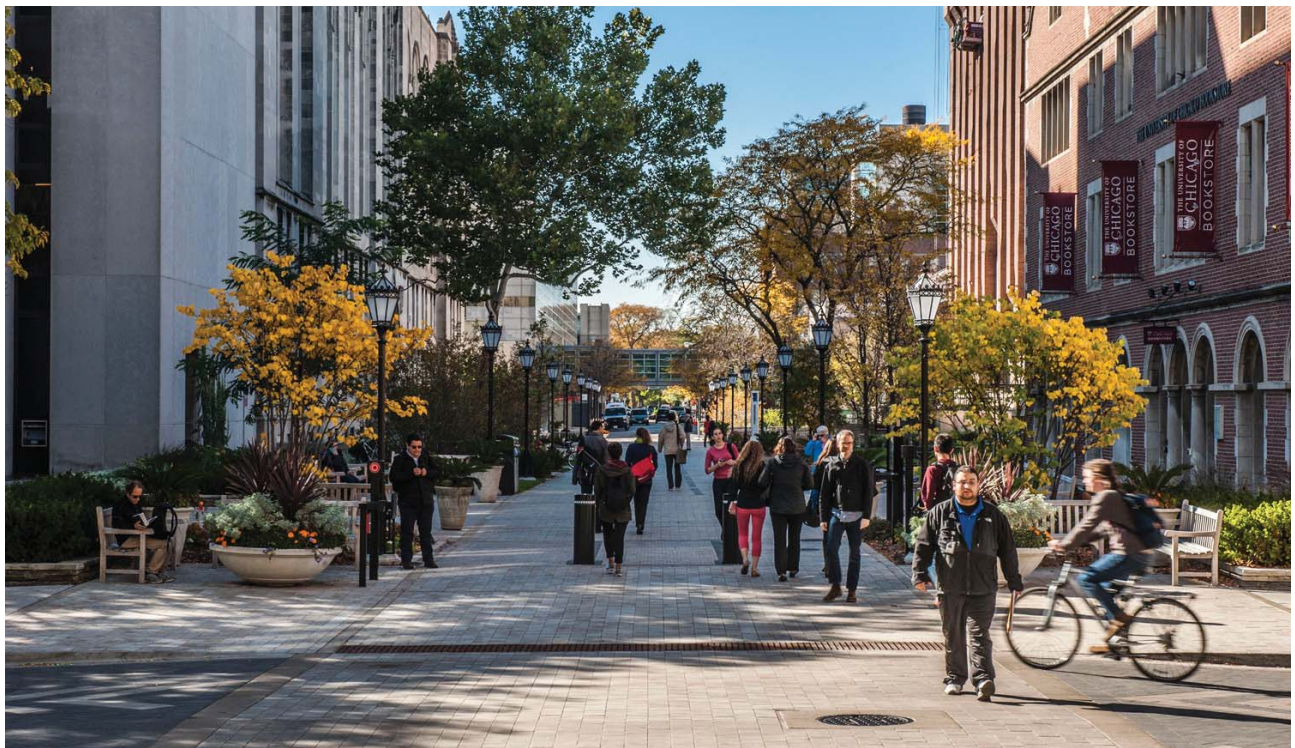


Figure 2.14 Pedestrian Spine Bustling With Human Scale Activity

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Courtesy Of: site design group, ltd. / [www.site-design.com](http://www.site-design.com)

# NEWCOMB MCALISTER UNIFIED GREEN:

<b>FIRM:</b>	Towers Golde
<b>LOCATION:</b>	New Orleans, LA   Tulane University
<b>SIZE:</b>	1.61 Acres
<b>CONTEXT:</b>	The project is within the heart of an urban university campus on axis with the main quadrangle of the university.
<b>USERS:</b>	University students and faculty as both pedestrians and bicyclists
<b>DILEMMA:</b>	A busy one way street with diagonal parking disrupted the flows of pedestrians between campus buildings and open spaces.
<b>GOALS:</b>	Removing vehicles off of one of the most trafficked streets on the campus was the primary goal. This allows a larger pedestrian campus core connecting several administration buildings and quads to become better linked. The street also acts as green infrastructure to infiltrate stormwater.
<b>PROGRAM ELEMENTS:</b>	Benches, pedestrian scale site lighting, bicycle storage, tables, bollards to separate traffic, trees, showy plant material, stormwater infrastructure
<b>DESIGN CONCEPT:</b>	The university's busiest street was re-imagined as a shared bicycle and pedestrian space to discourage driving. This project also has a clear focus on sustainability as it provides stormwater infrastructure and native plantings.
<b>TAKEAWAYS:</b>	This project illustrates the simplicity with which a connective space can be introduced into the campus environment. The former campus street is replaced with a series of native landscaped beds and a large pedestrian way. This space is designed as a shared space between bicyclists and pedestrians, and provides easier and safer access to the campus core. Benches strategically placed under mature shade trees allow students to rest or converse without turning their back on the main circulation spine. The width of the pedestrian mall allows socialization between larger groups of students during even the busiest hours of the school day.





Figure 2.15 Wide Pedestrian Paths Reunite Campus Core



Figure 2.16 Semi-Enclosed Seating Creates Intimacy



Figure 2.17 Obscurity Before Design Intervention



Figure 2.18 Pedestrian Spine Reinforces Spatial Clarity

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Courtesy Of: TowersI Golde Landscape Architects & Site Planners



# CALIFORNIA STREET PEDESTRIAN MALL:

<b>FIRM:</b>	studioINSITE
<b>LOCATION:</b>	Omaha, NE   Creighton University
<b>SIZE:</b>	8.57 Acres
<b>CONTEXT:</b>	The project is within the heart of a grid-locked urban campus surrounded with expansive parking lots and interstate highways and acts as the front porch to several important campus buildings.
<b>USERS:</b>	University students and faculty are the main users of this space.
<b>DILEMMA:</b>	The corridor once held a streetcar route with several rail lines on a site with steep slopes leading to dangerous conditions. The street was a barrier for pedestrian movement and gathering within the campus core.
<b>GOALS:</b>	The project's main goal was to transition a dead linear space into a series of human scale gathering places while prioritizing pedestrian movement through the campus.
<b>PROGRAM ELEMENTS:</b>	Fountains, pedestrian scale site lighting, grade change, bollards to separate traffic, trees, showy plant material, emergency access drive, sculptures
<b>DESIGN CONCEPT:</b>	This pedestrian mall is designed to be an elegant container for various active and passive activities including socialization. Furthermore, the design seamlessly blends the site's past into it's present and future by recalling the streetcar rails through design cues in the paving patterns.

## TAKEAWAYS:

The California Street pedestrian mall is a superb example of how a campus circulation space can also respond to needs for gathering and socialization by shaping several subspaces along the major campus axis. Grade changes are accommodated through stepped walls that provide informal opportunities for students to sit and gather. Artistic landform is utilized to highlight transitions from public to more private spaces. A sculptural fountain marks the central activity node and focal point of the mall



Figure 2.19 Art Creates Focal Point Within Pedestrian Plaza  
| By Flickr User: Raymond Bucko, SJ



Figure 2.20 Walls Create Informal Seating Opportunities  
| By Creighton University (used with permission)



Figure 2.21 Intimate Seating Area Adjacent To Mall  
| By Creighton University (used with permission)



Figure 2.22 The Pedestrian Mall Links Many Buildings Within The Campus Core  
| By Wikipedia User: Bluejayscholar

# ST. THOMAS STUDENT LIFE MALL:

<b>FIRM:</b>	TBG Partners
<b>LOCATION:</b>	Houston, TX   University of St. Thomas
<b>SIZE:</b>	1.81 Acres
<b>CONTEXT:</b>	The university is directly southwest of downtown Houston, and involves one of the main thoroughfares of the campus and an adjacent parking lot.
<b>USERS:</b>	University students, faculty, and residents from surrounding neighborhoods are the main users of this space.
<b>DILEMMA:</b>	A campus masterplan conducted by TBG Partners in 2002 identified that the campus core was lacking in pedestrian access and spaces for students to gather. The parking lot adjacent to the project site was also an eyesore .
<b>GOALS:</b>	Campus beautification was the first priority of this project, as it was used as it presented a major opportunity to unite the disconnect campus buildings within one unified landscape framework.
<b>PROGRAM ELEMENTS:</b>	Fountains, pedestrian scale site lighting, bollards to separate traffic, trees, showy plant material, defined subspaces, sculptures, wayfinding signage
<b>DESIGN CONCEPT:</b>	The project's central theme involves bringing nature and public life back into the formerly hardscaped expanses of the campus core. The design carefully responds to the programmatic functions of each building it frames.

<b>TAKEAWAYS:</b>	The Student Life Mall provides a great example of how intimate spaces can coexist with busy circulation routes in a campus environment. The design utilizes a variety of seating types to give users choice in experience. Paving patterns and changes in the materiality of the ground-plane help to signify differences in spatial function and character. University branding is applied through paving patterns to further shape the identity of the space. A meandering path subtly breaks up the monotony of the largely orthogonal circulation within the campus, and fountains add visual interest to the space.
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Figure 2.23 Intimate Subspaces Provide Opportunities For Socializing



Figure 2.24 Several Fountains Animate The Space



Figure 2.25 Benches Set Back On Path Allow Surveillance



Figure 2.26 Spaces Allow Gathering Adjacent To Pedestrian Mall

All Images Used With Permission  
Courtesy Of: TBG Partners



# ELEMENTS & DESIGN CONSIDERATIONS:

Analysis of the four cases of campus street/streetcar closures has been pivotal in developing an understanding of how to design successful pedestrian scale spaces within former street corridors on a university campus. By highlighting the legibility of pedestrian circulation routes, these projects clearly give precedence to the pedestrian within the core of their respective campuses. All of the cases examined shared the primary goal of established a greater degree of pedestrian unity within the campus core. The examination of these cases revealed three critical themes that the program elements and design considerations can be categorized within specific themes to organize design related decisions. The first of these themes is centered on design decisions to create a human scale environment, an important built environment consideration in increasing the modal share of walking (Saelens and Handy, 2008). Sidewalks adjacent to busy campus streets oftentimes leave users feeling uncomfortable or stress out (see below) as pedestrians feel unwelcome in the vehicle dominated space. The second theme involves the creation of an aesthetically pleasing circulation route to shape an experience rather than simply allowing a

behavior to occur. Circulating through a pleasant, landscaped pedestrian mall rather than walking or cycling next to impatient drivers who's vehicles bring unsightly traffic, engine noise, and noxious exhaust fumes to the campus environment assists the creation of a memorable campus experience. By thinking about the procession of a user through a series of campus spaces along these pedestrian malls, there is an opportunity for pedestrians to become more actively engage in their surroundings. The last theme is related to the potential of the campus environment to foster social interaction (Kenney et al., 2005), thereby increasing the potential for the community building within outdoor spaces. This is achieved in all four projects simply through consolidating pedestrian flows to a unified space that allows more planned and unplanned encounters to occur while also providing gathering spaces, benches, and tables. Specific design element that have been utilized in the cases analyzed are illustrated on the facing page in Table 2.2 and further organized into the three themes in Table 2.3. Overall, campus road closures have been identified as a successful strategy to promote walking and create a cohesive campus core.

## 79%

of students surveyed feel **more stressed out** when walking **alongside campus streets** compared to walking next to open, natural spaces



(online survey by author, 2015)

## 92%

of students surveyed would be **more likely to spend time in a quiet, calm, and peaceful space on campus than one near a vehicular street with traffic**



(online survey by author, 2015)

Program Elements & Design Considerations	University of Chicago 58th Street	Newcomb Mcalister Unified Green	California Street Pedestrian Mall	Student Life Mall	Sums
Extended Sightlines & Legibility	●	●	●	●	4
Removal of Vehicular Traffic	●	●	●	●	4
Pedestrian Scale Lighting	●	●	●	●	4
Benches	●	●	●	●	4
Showy Vegetation	●	●	●	●	4
Legible Circulation Routes	●	●	●	●	4
ADA Accessibility	●	●	●	●	4
Trees + Attractive Plantings	●	●	●	●	4
Intimate Gathering Spaces	●		●	●	3
Engaging Paving Patterns	●		●	●	3
Context Sensitive Material Choices	●		●	●	3
Retractable Bollards	●	●		●	3
University Branding		●		●	3
Tables		●	●	●	3
Water Feature(s)			●	●	2
Bicycle Racks	●	●			2
Informal Seating			●	●	2
Service/Emergency Access	●	●	●		2
Multi-Functional Plaza Space			●	●	2
Raised Planting Beds	●		●		2
Shared Bicycle/Pedestrian Space		●		●	2
Visual Landmark(s)			●		1
Gateway				●	1
At Grade Planting Beds	●				1
Separation Through Elevation Change			●		1

Table 2.2 Campus Street Closure Case Study Program Elements And Design Considerations | By Author

HUMAN SCALE	AESTHETICALLY PLEASING	SOCIALLY ENGAGING
Removal of Vehicular Traffic	Trees + Attractive Plantings	Extended Sightlines & Legibility
Pedestrian Scale Lighting	Engaging Paving Patterns	Benches
Legible Circulation Routes	Context Sensitive Material Choices	Intimate Gathering Spaces
ADA Accessibility	University Branding	Tables
Retractable Bollards	Water Feature(s)	Informal Seating
Bicycle Racks	Raised Planting Beds	Separation Through Elevation Change
Visual Landmark(s)	Gateway	Multi Functional Plaza Space
	At Grade Planting Beds	

Table 2.3 Themes Related To Specific Program Elements & Design Considerations | By Author



# BICYCLE INFRASTRUCTURE CASE STUDIES

## ANALYSIS & SELECTION RATIONALE

Two cases involving significantly different approaches to the promotion of student participation in active transportation are explored in order to gain a better understanding of the design and planning considerations required to develop a successful bicycle infrastructure system within the context of a university campus. The first case investigates a campus that is widely recognized for its comprehensive system of physical bicycle infrastructure including well established parking, separated bicycle paths, bicycle support services, and responsive policy. The second case explores a new generation of bicycle sharing within another progressive university campus that increases students' mobility and likelihood to participate in physical activity. These cases were selected based on recognition at a national level of their ability to support the physical health and sustainability agendas established by these universities as leaders.

## OBJECTIVES OF CASE STUDY ANALYSIS

By studying several well executed examples of measures taken within these two campuses, specific planning and design goals and objectives can be established to support increased physical activity among the student body. The takeaways extracted from this analysis will then be programmed into the design frameworks discussed in more depth within the Synthesis chapter of this document. Overall, by analyzing the success of other universities, Kansas State can emerge as a leader in health promotion practices.

Figure 2.27 Bicycle Parking At UC Davis | By Wikipedia  
User: Amerique







# UC DAVIS BICYCLE INFRASTRUCTURE SYSTEMS:

<b>STUDENT BODY SIZE:</b>	35,415
<b>LOCATION:</b>	Davis, California
<b>CAMPUS AREA:</b>	5,300 Acres
<b>CONTEXT:</b>	The university is located directly adjacent to the City of Davis in a suburban context approximately fifteen miles West of Sacramento.
<b>GOALS:</b>	The primary goal of the provision of bicycle infrastructure is to maximize the safety and comfort of current and potential new bicyclists within the campus.
<b>INFRASTRUCTURE TYPES:</b>	The comprehensive bicycle infrastructure systems at UC Davis includes separated bicycle paths, dedicated bicycle streets, bicycle lanes, ample and convenient bicycle parking, an on campus bicycle repair shop, and mid-block crossings established for bicyclists' visibility and safety
<b>DESIGN CONSIDERATIONS:</b>	Primary design considerations that have been applied within the campus include separation of travel modes, an emphasis on visibility and sight lines, communication between travel modes through signage and wayfinding, and continued testing, observation, and tweaking as user needs and campus environments evolve. UC Davis provides three types of bicycle circulation within its campus - on street bicycle lanes, separated bicycle paths, and dedicated bicycle streets based on the demand for access in various campus locations. Nearly all streets within the campus' core have entirely removed or significantly restricted automobile access. This creates a safer environment to bicycle within along with the many social & restorative benefits discussed previously in this chapter. Careful response to the dangers that pedestrian/ bicyclist conflict creates allows thousands to safely bicycle every day.

**TAKEAWAYS:** Overall, while this case represents a best case scenario with several decades of policy, budgetary, and civic support, it still provides many lessons that can be emulated and adapted by university campuses across the nation seeking to increase the modal share of bicycling on campus. By providing several types of dedicated facilities for cyclists, UC Davis has afforded students the opportunity to travel in a safe, effortless, and healthy manner.



Figure 2.28 Dedicated Bicycle Circles Allow Easy Interchange  
| By Skip Mezger



Figure 2.29 Mid-Block Crossings Simplify Bicycle Travel  
| By Skip Mezger



Figure 2.30 Ample Bicycle Parking Promotes System Use  
| By Skip Mezger



Figure 2.31 Separated Bicycle Paths Minimize Conflicts Between Travel Modes  
| By Skip Mezger

All Images Courtesy Of: Skip Mezger,  
ASLA, Senior Campus Landscape Architect  
UC Davist



# UNIVERSITY OF VIRGINIA UBIKE BIKE SHARE:

**STUDENT BODY SIZE:** 21,238

**LOCATION:** Charlottesville, Virginia

**CAMPUS AREA:** 1,682 acres

**CONTEXT:** The university lies on the West side of Charlottesville, a modest city with an independent population of 44,000 and a metro population of 207,000 people.

**DILEMMA:** Several undergraduate students at UVa recognized that there was a distinct lack of flexible transportation options for students to take advantage of once they had arrived on campus.

**GOALS:** The main goals of the project are to provide increased mobility options to students already on campus and to collect data related to students' campus bicycling patterns.

**PROVIDER:** Social Bicycles, based out of New York City acts as the primary service provider

**HOW IT WORKS:** The concept reverses traditional smart bike share systems which have a "smart rack" that acts as a dock for "dumb bikes" by embedding GPS enabled computers within each individual bike. Users can reserve a bicycle locked to any bicycle rack within the campus online, through an app, or on a bicycle mounted keypad. Users are encouraged to return bicycles to specific UBIke "hubs" around the campus through small monetary rewards and fines. This flexibility allows students much more freedom to move about the university campus throughout their day, often reducing the need for inter-campus vehicular travel.

**FLEET SIZE:** The current UVA fleet consists of 120 smart bicycles and 18 branded bicycle hubs

**PROJECT FUNDING:** The project was funded by a \$350,000 grant from the Virginia Department of Transportation, as well as through subsidies from UVa's department of parking and transportation and membership fees

**PRICING:** Day: \$5 (2 hours) | Monthly: \$20 | Semester: \$30 | Yearly: \$60 (90 minutes daily time)

**DATA:** GPS data from students' bicycle trips can be used to plan and rationalized future campus infrastructure improvements to increase active transportation modal shares.

**TAKEAWAYS:** This emerging approach to bicycle sharing within the campus provides unique opportunities to allow students increased access to campus resources, especially as campuses across the nation expand. The system is fairly low cost compared with other alternatives and requires few infrastructural additions within the campus.

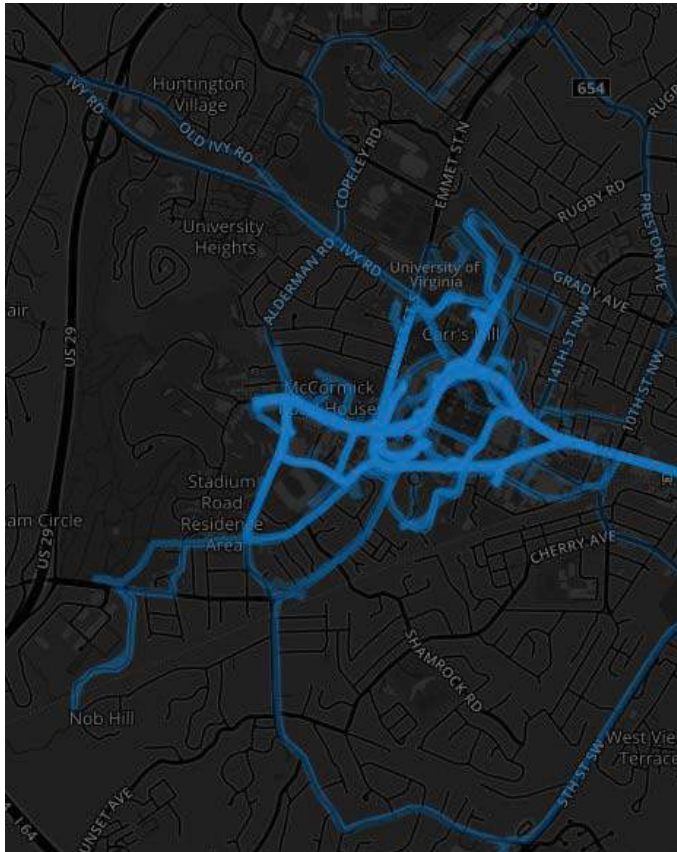


Figure 2.32 Embedded GPS Systems Allow Geospatial Mapping  
| By UVA UBike



Figure 2.33 Bicycles Are Simple And Functional  
| By Uva UBike



Figure 2.34 Web Based Reservation Adds Convenience  
| By Uva UBike



Figure 2.35 18 Bicycle Hubs Act As Primary Docking Stations For The Bicycles  
| By Uva UBike

All Images Used With Permission  
Courtesy Of: UVA UBike

## ELEMENTS & DESIGN CONSIDERATIONS:

Entire projects, reports, and theses have been dedicated to the study of correlation between the built environment and resulting human behavior patterns, however, within the focused conceptual scope of this Master's Project and Report, findings extracted from the analysis of these two cases are adequate to inform creation of a design framework. Two very different approaches to the promotion of physical activity through the act of bicycling have been investigated within the bicycle infrastructure cases described in the previous two spreads. As identified in the review of active transportation related literature, by increasing the amount of infrastructure dedicated to bicyclists, the expected modal share of bicyclists within a given environment will almost certainly increase (Pucher et al., 2010; Stinson and Bhat, 2003). The system of separated, dedicated bicycle infrastructure established at the UC Davis represents one of the most comprehensive campus bicycle networks in the country, and can be translated for application into many different university campus contexts. These additional affordances to engage in active transportation behaviors will then result in increased physical health among the student body.

As universities across the country have recognized the benefits of converting automobile streets to pedestrian thoroughfares and parking lots to higher density building infill, students will seek out new ways to navigate the campus. Bicycle sharing provides a lucrative opportunity to increase participation in bicycling within the campus context as many university students cannot afford their own bicycles and additionally require a flexible and quick way to travel through the campus between classes. While many different types of bicycle share systems were identified in reviewing large amounts of transportation literature and campus planning documents, the system recently established at the University of Virginia proved to be the most flexible, scalable, and financially successful model. This system, with the backing of a centralized national provider, provides the technology savvy college students of the 21st century with a realistic opportunity to increase participation in physical activity through bicycling. Overall, analysis of these two cases has provided foundational planning and design knowledge to facilitate the creation of a more active campus environment through the design of campus streets.

# 67%

of students surveyed feel would be **more likely to ride a bicycle** to campus and class **if separated bicycle lanes** were added within the campus



(online survey by author, 2015)

# 33%

of students surveyed would be **more likely to bicycle** to campus rather than driving a personal vehicle if there were a bicycle sharing program on campus



(online survey by author, 2015)



# INFRASTRUCTURE IMPROVEMENTS TO INCREASE CAMPUS BICYCLING

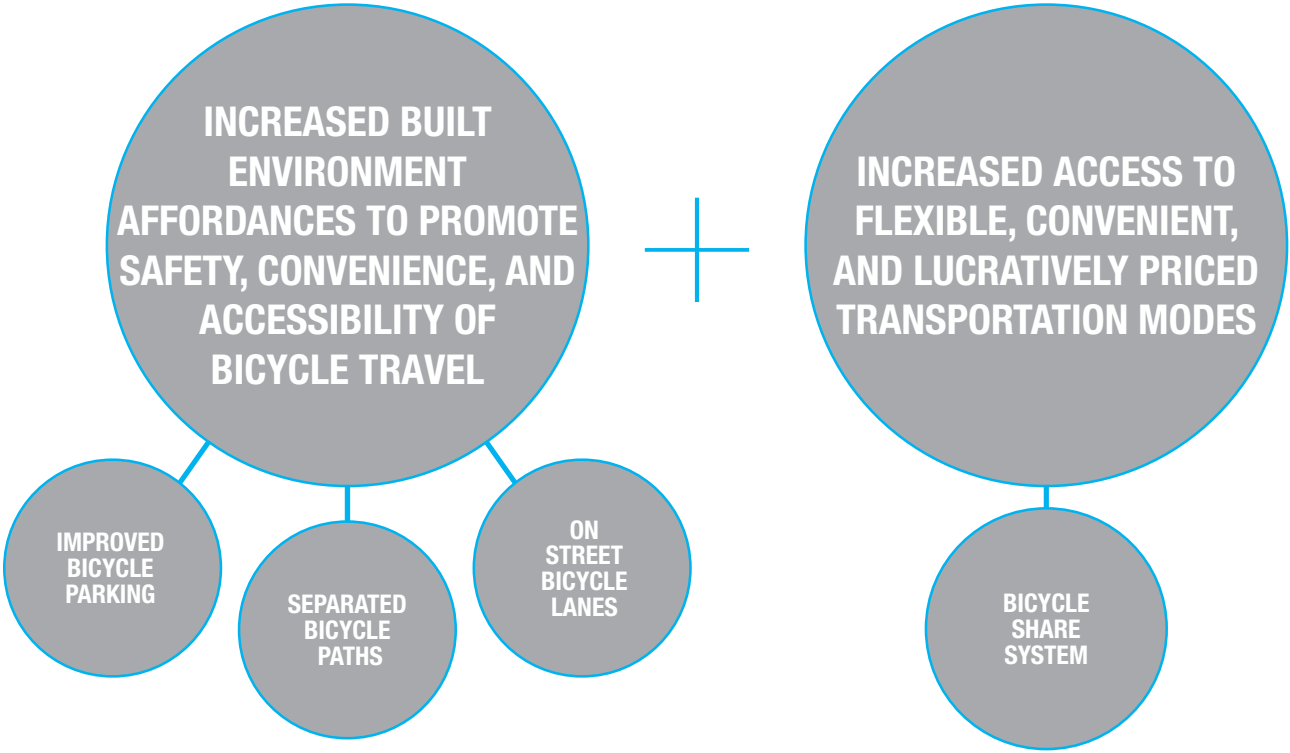


Figure 2.36 Bicycling Infrastructure Improvement Recommendations | By Author



# RESTORATIVE LANDSCAPE CASE STUDIES

## ANALYSIS RATIONALE

Restorative landscapes, as described within the literature review, provide opportunities for stress relief, improved mood, and increased focus (van Praag, 2005; Ulrich, 1999). While they are currently primarily observed within healthcare settings, restorative landscapes have the potential to provide these benefits to a wider range of users. Much of the literature related to restorative garden design is theoretical and quite conceptual, potentially making the translation from concept to design application difficult. By analyzing several model examples of restorative landscapes, connections between the conceptual literature and practical design observations can be made. Determining which specific design elements within these built environments is responsible for these benefits through quantitative research has proven to be difficult. However, by analyzing these spaces, the restorative and healing properties felt by users of the cases can be applied to new projects.

## OBJECTIVES OF CASE STUDY ANALYSIS

Analysis of four built cases of restorative landscapes in the United States is intended to provide a deeper comprehension of specific program elements & design considerations that stimulate a restorative environment. The findings will be categorized by garden and recurrence rate between projects to identify which factors may be more important in the creation of a restorative landscape. Synthesis of these findings will result in a more thorough and compelling final product.

## SELECTION RATIONALE

Selection of restorative landscape cases was based on two primary categories, the first of which required the built work to be publicly accessible. Many restorative landscapes encountered by the author in searching for acceptable cases were privately owned by hospitals, and not accessible by the general public. The private gardens were no less restorative by any means; however, to provide the most relevance to the application of restorative landscapes within the university campus, analysis of a publicly accessible landscape allows for the most logical translation of design findings. As these publicly accessible gardens must respond to constraints such as security, maintenance, and access more similar to that of a university campus, they emerge as an obvious choice for analysis. The projects represented exist at several scales within a variety of urban and suburban contexts to allow a more rich analysis.

Secondly, the garden must have been awarded by a professional organization for its excellence related to restoration or healing. By scrutinizing only award winning examples of restorative garden design, further filtering and quality control has been provided to this case study analysis. As well respected and award winning projects, these cases have set themselves apart from other built works and provide an excellent opportunity for analysis. These restorative landscape cases and the awards associated with each are listed on the summary page following analysis of the individual cases in Table 2.4





Elizabeth & Nona Evans Restorative Garden	Garden of Healing and Renewal	Spaulding Rehabilitation Hospital Garden	Mary and Al Schneider Healing Garden
2006 American Horticultural Therapy Association Therapeutic Garden Design - Honor Award  2006 National ASLA - Honor Award in General Design	2009 Michigan Chapter, ASLA - Design Award Award Winner  2013 Landscape Architecture Awards for Healthcare Environments - Acute Care Bronze Winner	2013 Landscape Architecture Awards for Healthcare Environments - Acute Care Silver Winner	2012 Ohio Chapter, ASLA - Award of Honor  2013 CSLA - Citation Award

Table 2.4 Restorative Landscape Cases & Associated Awards | By Author



# ELIZABETH & NONA EVANS RESTORATIVE GARDEN:

<b>FIRM:</b>	Dirtworks, PC
<b>LOCATION:</b>	Cleveland, Ohio
<b>SIZE:</b>	.28 Acres
<b>CONTEXT:</b>	Highly maintained botanical gardens which both afford views to the healing garden and serves as a backdrop to the project.
<b>USERS:</b>	General public, groups of mentally and physically handicapped individuals are oftentimes taken on guided therapeutic tours through the space
<b>DILEMMA:</b>	Lack of accessible therapeutic public space in botanical garden setting
<b>GOALS:</b>	Create a publicly accessible restorative garden to relieve stress for all individuals whether they suffer from mental illness, dementia, other conditions, or are completely healthy. A secondary goal is to celebrate nature through the a landscape of delight and surprise.
<b>PROGRAM ELEMENTS:</b>	Water feature, open lawn, multiple rooms, legible layout, multi-sensory planting, framed view, protected seating, raised planter beds
<b>DESIGN CONCEPT:</b>	The garden is broken down into three distinct settings, each with their own purpose and unique program elements. The garden seeks to provide opportunity and choice for visitors to engage with nature in their own way, on their own terms, and at their own pace.
<b>DESIGN APPROACH:</b>	A shared botanical and people oriented approach determines major design decisions. The garden acts as an extension of the existing botanical garden and artistically integrates multi-sensory plantings to enrich and enliven the spaces. Horticultural therapy allows users to learn about gardening techniques and specific plants in close proximity to therapeutic nature.



Figure 2.38 Site Plan Illustrates Spatial Richness  
| © Dirtworks, PC (used with permission)



Figure 2.39 Fountain Creates Pleasant White Noise  
| © Dirtworks, PC (used with permission)



Figure 2.40 Contemplation Garden Allows Users To Find Reflective Solitude  
| © Dirtworks, PC (used with permission)



# GARDEN OF HEALING AND RENEWAL:

<b>FIRM:</b>	Professional Engineering Associates, Inc.
<b>LOCATION:</b>	Independence Township, MI
<b>SIZE:</b>	4.25 Acres
<b>CONTEXT:</b>	The project is located adjacent to a medical campus containing laboratories and a cancer center, but remains accessible to the public
<b>USERS:</b>	General public, individuals receiving care at adjacent cancer and medical centers, and nurses and staff at medical centers
<b>DILEMMA:</b>	Lack of accessible outdoor space for stress relief for patients + staff
<b>GOALS:</b>	Create a publicly accessible restorative garden to relieve stress for those being treated at the adjacent cancer center. The project aims to provide a sense of spatial medicine to treat cancer while acknowledging the need for the healing of the spirit in a more spiritual sense.
<b>PROGRAM ELEMENTS:</b>	Water feature, artistic night lighting, multiple rooms, legible layout, multi-sensory planting, walking loop, protected seating, native planting, art
<b>DESIGN CONCEPT:</b>	The intention was of the project was to create an oasis for meditation. The garden is conceived as a delightful escape from reality in the form of a explorative experience. The entrance is very legible and formal, however as one moves through the space the garden becomes more organic in form.
<b>DESIGN APPROACH:</b>	The garden is conceived through the lens of a traditional restorative design approach as it incorporates regional characteristics through native plantings and art through sculptural installations alongside many of the garden's paths. Additionally, the project includes a walking labyrinth which is often believed to bring spiritual healing and discovery.





**Figure 2.43** Protected, Moveable Seating Provides Prospect & Refuge  
| By Sandie Parrott , Freelance Writer and Photographer  
(used with permission)



**Figure 2.41** Sinuous Path Winds Through A Native Meadow Space  
| By Sandie Parrott , Freelance Writer and Photographer  
(used with permission)



**Figure 2.42** Tactile, Sculptural Art Avoids Abstraction  
| By Sandie Parrott, Freelance Writer and Photographer  
(used with permission)



**Figure 2.44** A Labyrinth Has Been Designed With Sacred Geometry In Mind To Enhance Healing  
| By Paula Peace , Peacescapes Garden Design, Geomancy and Feng Shui (used with permission)

# SPAULDING REHABILITATION HOSPITAL GARDEN:

<b>FIRM:</b>	Copley Wolff Design Group
<b>LOCATION:</b>	Charlestown, MA
<b>SIZE:</b>	.58 Acres
<b>CONTEXT:</b>	This garden acts as a visual and spatial buffer between a teaching hospital and Boston's Inner harbor. The garden is accessible to the public via a boardwalk, but is designed primarily to rehabilitate and restore patients.
<b>USERS:</b>	General public, individuals receiving care at adjacent hospital, and nurses and staff at the hospital who need a break from their stressful jobs.
<b>DILEMMA:</b>	Distinct lack of connection between hospital and community
<b>GOALS:</b>	The hospital sought a way to create a space to act as transition both physically and metaphorically between life in the hospital and the outside world. This garden provides amenities for both users of the hospital and the surrounding community. Overall the hospital wanted to create a vibrant, therapeutic, and communal space.
<b>PROGRAM ELEMENTS:</b>	Water feature, artistic night lighting, multiple rooms, legible layout, multi-sensory planting, walking loop, protected seating, native planting, art
<b>DESIGN CONCEPT:</b>	The project provides three main responses as a therapeutic landscape by providing opportunities for physical activity through programmed activity zones, cognitive function through sculpture, and community engagement by including elements such as a fish cleaning station.
<b>DESIGN APPROACH:</b>	This garden responds to it's dilemma through a shared people oriented and traditional approach. Bronze sculptures animate the space while elements for community use bring increased levels of interaction.





Figure 2.45 Site Plan Emphasizes Garden Circulation  
| By Copley Wolff Design Group (used with permission)

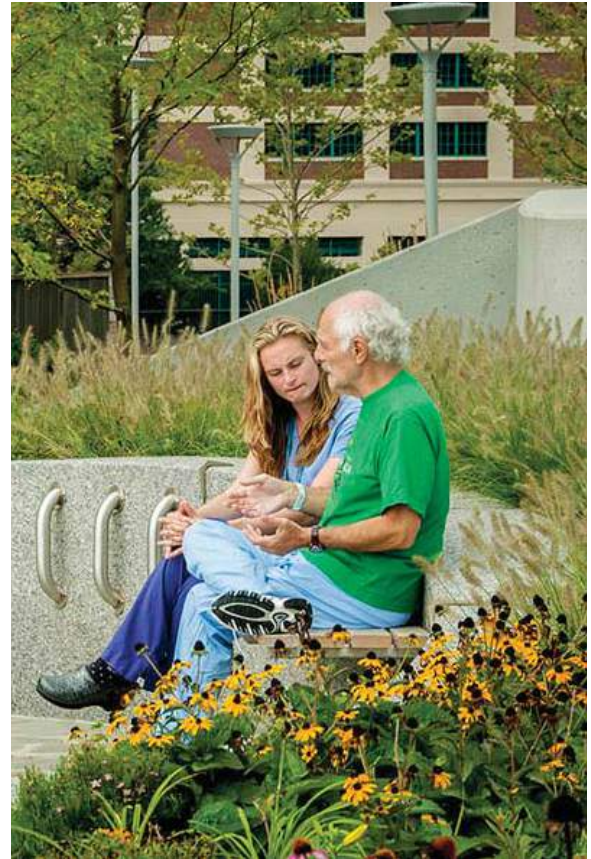


Figure 2.46 Protected Seating Nooks Allow Conversation  
| By Luke O'Neill (used with permission)



Figure 2.47 Circulation Hierarchy Reinforced By Material Choice  
| By Luke O'Neill (used with permission)

All Images Used With Permission  
Work In All Images Completed By: Copley Wolff Design Group



# MARY AND AL SCHNEIDER HEALING GARDEN:

<b>FIRM:</b>	Virginia Burt Designs
<b>LOCATION:</b>	Cleveland, OH
<b>SIZE:</b>	.35 Acres
<b>CONTEXT:</b>	This garden acts as part of the entry sequence to the Seidman Cancer Center and sits within an urban context adjacent to an intersection.
<b>USERS:</b>	General public, individuals receiving care at adjacent hospital, and nurses and staff at the hospital who need a break from their stressful jobs.
<b>DILEMMA:</b>	Lack of natural accessible outdoor space for stress relief for patients + staff
<b>GOALS:</b>	The garden is intended to encourage calm, comfort and relaxation with the overall goal of reducing the stresses of illness and hospitalization. It was meant to be appreciated from both the ground level and the windows of adjacent hospital rooms.
<b>PROGRAM ELEMENTS:</b>	Water feature, artistic night lighting, multiple rooms, legible layout, multi-sensory planting, tables for activities protected seating, native planting, art
<b>DESIGN CONCEPT:</b>	The design centers around a large granite labyrinth which is screened from adjacent paths by vegetation and grade change. This labyrinth provides the organizational cues to the rest of the garden's subspaces and seating. The garden contributes a variety of spaces for gathering and reflection.
<b>DESIGN APPROACH:</b>	The garden approach is categorized as a split traditional and botanical approach as it incorporates a traditional labyrinth as well as other sculptural art pieces meant to evoke the four elements of earth, wind, fire, and water. The garden also utilizes over 120 plant varieties chosen for their scent, color, structure and blooming times.



Figure 2.49 Walls + Vegetation Provide Spatial Enclosure  
| By Lynn Ischay (used with permission)



Figure 2.50 Sculptures Along Path Draw Users Through The Space  
| By Lynn Ischay/The Plain Dealer (used with permission)



Figure 2.48 A Patient "Walks" The Garden From His Room's Window  
| By Lynn Ischay/The Plain Dealer (used with permission)

All Images Used With Permission  
Work In All Images Completed By: Virginia Burt Designs

# LITERATURE THEME SYNTHESIS OF CASES

## NATURE + STIMULATION

The Elizabeth & Nona Evans Restorative Garden provides an intimate setting to interact with nature within a larger botanical garden. The botanical garden provides a serene backdrop to the restorative garden and ensures that users feel connected with their natural surroundings. Positive distractions are provided with visually stimulating elements such as a reflecting pool and fountain, delicate and showy foliage, and a monoculture of basil plants which provide sensory stimulation through their delightful smell. There is a clear domination of natural surfaces in favor of hardscaped elements on both the horizontal and vertical planes within the garden, further increasing the restorative quantities of the space.

The Garden of Healing and Renewal is unique in that it provides exposure to a variety of natural scene types ranging from highly structured and maintained to very loose and wild. The site was originally a residential lot that contained a densely wooded wetland, a small stream, and a pond. These natural, existing features were incorporated in the design proposal by establishing a winding path to provide circulation through the site. The formal area of the garden is structured by a series of radial paths which contain showy and highly maintained planter beds. Dense plantings within the formal zone of the garden rarely exceed waist height, and the tree canopy has been pulled back to reveal the sky within this space. The vast majority of the ground plane

within the garden is softscaped, however an expansive hardscaped labyrinth has been placed within the formal zone of the garden to allow contemplation through walking meditation.

The Spaulding Rehabilitation Hospital Garden takes advantage of native and low maintenance plantings to provide a prevalence of green material on the site. Most of the vegetation on site remains below users hip level to preserve sight lines and allow sun to reach the open spaces within the garden. Trees are carefully arranged at regular intervals along the main circulation path to shade users as they view and move through the space. Additionally, an undulating retaining wall winds next to this circulation path and allows users to more closely interact with the vegetation. Alongside several of these walls, built in benches allow people to spatially envelop themselves within the landscaped surroundings. A high degree of variety in plant texture and form provides soft fascination and moreover, several species of grasses which dance rhythmically in the harbor side breezes act as positive distractions to the stressed users of this space. The plant material itself is set at staggered heights to allow individuals in both wheelchairs and on foot to enjoy them. The proximity to Boston's inner harbor provides views to the waterfront that further allow soft fascination to occur in visitors.

The Mary and Al Schneider Healing Garden is envisioned as a green oasis within the urban fabric of Cleveland and lies near the intersection of two busy streets. Dense plantings create a






## **ELIZABETH & NONA EVANS RESTORATIVE GARDEN**



## **GARDEN OF HEALING AND RENEWAL**

strong sense of enclosure within the circulation routes and sitting areas of the garden. The plant palette was selected in order to have excellent year round interest including fall color, branching structure during winter, and blooming times during spring and summer. By emphasizing the importance of year round interest, the garden can provide healing and restoration to users even when the trees and other plants are bare. A variety of perennials, native trees, dwarf evergreens, and shrubs have been planted to create this stimulating environment while simultaneously defining space and controlling views to and from of the site. The planting beds pair dozens of boulders from the existing site with vegetation to create the feeling of wild and unconstrained nature within the city. This juxtaposition of city and nature allows users to feel that they are truly away in a different world. Trees are selectively used to reinforce spatial edges within the garden as well as to provide shade to the benches and gathering spaces to increase user comfort.

### **MOVEMENT + CONTROL**



A variety of paths of different sizes and materiality within the garden provide opportunities to experience the space in whichever way the user feels most comfortable. The garden's hierarchy and separation of circulation allows tour groups to move through the space without disturbing individuals who may be meditating or reflecting on their own. Circulation is primarily provided around the edges of the subspaces within the




## **SPAULDING REHABILITATION HOSPITAL GARDEN**



## **MARY AND AL SCHNEIDER HEALING GARDEN**

garden, allowing users to feel a heightened sense of control within their immediate surroundings. Meandering paths allow the garden to reveal itself to users in a very organic and natural manner. All of the paths within the garden are designed to be fully ADA accessible, further promoting a user's sense of control within the space. The division of the garden into three, smaller subspaces allows a sense of visual extent when experiencing each individual space, allowing users to fully comprehend and examine the spaces upon entry. A variety of benches, moveable seating, and low walls gives users of the space a significant amount of choice in how they wish to experience and inhabit the space.



As this garden is a public amenity, it remains open to all those who wish to utilize it throughout the day and night. It connects to existing sidewalks and a local bicycle lane to allow users to access the site by means of active transportation. The project, which encompasses over 4 acres of land within a medical complex, contains a large looped walking path near its perimeter to promote exercise of garden users. The winding nature of the path intrigues users to explore what lies around each bend while also providing views towards several sculptures to draw users through the site. A clear hierarchy of circulation paths has been provided to separate walking users from those who seek out more personal or intimate experiences. All of the primary circulation routes are designed to be ADA accessible to allow access by all those interested in taking part in healing and renewal. The constant reorientation of one's body as

one experiences both the labyrinth and the curvilinear pathways of the garden provides positive distractions to reduce stress.

The garden contains a small but well utilized walking loop to allow patients, workers, and visitors to participate in exercise and practice for real world challenges. Within the six foot wide therapy trail, there are several markers embedded within the concrete to inform users of the distance that they've traveled thus far. A secondary walkway challenges more advanced patients with inclines as steep as 4.8 percent. To further promote exercise and activity among users, a small putting green has been included within the garden. The putting area is tucked away from the majority of the garden to limit the intrusion of those using the green on individuals who may be quietly reflecting. Adjacent to the putting green, a seven foot tall wall has been mounted with bars that can be used by patients for upper body exercises. The entirety of the site is ADA accessible and the designers have provided handrails alongside all circulation paths, including those not classified as ramps.

As this garden is only 13,000 square feet, there is only one circulation path that passes through the project. However, the expansive labyrinth space acts as a central focal point which the other garden spaces are organized around and encourages users to walk for meditative purposes. Sculptures representing the four elements of earth, wind, fire, and water have been arranged to draw users through the space

to encourage exercise. As users move through the garden, sculptural vertical planes paired with variation in vegetation height enable access to privacy from the outside world and other users of the garden. The gently sloping ground plane of the garden submerges gathering and sitting spaces slightly below street level, giving users further control over their level of privacy when enjoying the garden. The garden is entirely ADA accessible to permit users of all skill and health levels to enjoy the space.

## **RICHNESS + VARIETY**

The variety of subspaces within the garden is the primary method by which it achieves richness and variety. The contemplation garden, the garden for learning and exploring, and the garden for horticulture therapy all serve different functions and have an entirely different spatial character. Visual complexity is enhanced through a planting palette that is diverse in color, texture, scent, and height. Views within the garden are carefully considered and revealed to users through several defined and implied frames, creating a sense of discovery and mystery as one moves through the sequence of garden spaces. Additionally, planting masses mask views and enhance this sense of mystery within the garden. While most of the spaces within the garden are laid out in an organic manner, the contemplation garden provides juxtaposition through its much more formal and geometric design. This juxtaposition creates variety in spatial experience of the garden as

users circulate through the site. Varying the sun and shade exposure as users move through subspaces enhances the spatial richness as well.

The meandering paths within the project paired with the undulating retaining walls carefully hide and reveal views to those moving through the space. This sense of mystery created through the subtle changes in viewing direction give the experience of the garden a heightened sense of spatial richness. A wide variety of hardscaped materials have been utilized within the site including brick, concrete, flagstone, wood, crushed stone, and stainless steel. This rich material palette gives the subspaces of the garden their own unique identity, and provides the site with a higher level of complexity as a whole. This garden also allows access to the public and provides several locations to fish and subsequently clean one's catches on site.

The garden was conceptualized and designed as a series of outdoor rooms connected by winding pathways to provide spatial variety. Each space has been designed for a specific use and allows users to experience the garden in a unique way. The site experience is extremely diverse as one moves from the structured and formal garden spaces bathed in sun, to the enclosed wetland grove, and then finally to the wild meadow. This variety of spatial character within each setting allows users to find a unique space that they most closely relate to for their own healing and renewal. As an archetypal symbol, the labyrinth within this project acts as a metaphor for one's journey of both life as a whole as well as the

process of healing for patients visiting the site.

The designers of the garden have crafted a variety of different spatial experiences through inclusion of several unique design features including a mist generating water feature, computer controlled colored lighting systems, dancing water pop jets, and carved granite boulder seating. Each space within the garden is unique and yet creates an overall sense of structured complexity. The design of the garden was inspired by a poem entitled "Halfway Down" by well known author AA Milne. The landscape architects have artistically applied themes of being "somewhere else instead" from the poem to create spatial metaphors and richness. This concept of being somewhere else instead aligns directly with the idea of being away discussed by Kaplan (1995).

## INTROSPECTIVE + PERSONAL

The contemplation garden provides the most introspective space within this project by providing spatial enclosure through vegetated walls. The human scale of the space and lack of distractions and intrusions from the outside make it a successful space for introspection and personal enjoyment. The reflecting pool within this space provides visual fascination by reflecting passing clouds and overhead branches without creating distracting noises. Seating nooks adjacent to the major circulation paths provide ample refuge by remaining tucked against walls and vegetation. This is intentionally done to prevent users from feeling exposed by



turning their back to others within the garden. Lastly, the garden takes advantage of significant grade change within the site to define subspaces and separate more social functions from the personal and introspective spaces.

The radial and curvilinear design of this project allows dozens of users to experience the space simultaneously without intruding upon others' experiences. Benches with protective vegetated backdrops have been strategically arranged within the site to allow users to lay claim to a specific personal space within the greater garden. By providing benches directly adjacent to the circulation paths, people watching is encouraged. A contemplation space has been provided near the junction of the formal and wild portions of the garden to allow personal meditation and reflection. All of the subspaces within the project have been designed with privacy in mind by providing vegetative screening to partially shield the spaces from major circulation paths. The labyrinth represents a personal journey, and allows one to seek out spiritual, mental and physical well being on their own. Its path is only wide enough for one individual to experience it at a time, creating a unique opportunity for personal healing and discovery.

While the vast majority of the garden is vegetated, several intimate seating nooks have been carved out of the at grade landscape beds. These nooks are tucked into the landscape and surrounded by seating walls to create refuge for individuals within the space. The spaces

are organized in a concave manner and are focused inward to allow users to feel as if they are away from the surrounding environment. Additionally, individual benches are placed alongside major and secondary circulation paths to give users the ability to claim and define their own personal spaces within the overall garden. The location of the garden at the tip of a peninsula within Boston's Inner Harbor allows for the minimization of external intrusions. The garden is protected from unpleasing noises such as traffic by the placement and massing of the building, and use of shielding vegetative elements,

Privacy within the garden is constructed through topographic relief, screening elements, and dense vegetation. By lowering the main gathering and sitting area below the surrounding context, a more intimate and introspective environment is created. Additionally, the submerged nature of the space limits the amount street noise and off site commotion that can enter the garden. The fountain and pop jets also create calming white noise to block undesirable noise intrusions from outside the site. These spaces provide a high degree of refuge to stressed out individuals, allowing them to let their guard down to simply view and enjoy restoration from the natural scene. Benches oriented towards several of the elemental sculptures and particularly showy vegetation enable users to enjoy the space on their own. The labyrinth, which is heated by a custom below grade snow melting system, allows users to experience a personal meditative journey year round.

## SOCIAL + COMMUNAL

While there are considerations for social and communal activities within this restorative garden, much of the social activity takes place directly adjacent to the garden within a public dining terrace. This project provides social support through the inclusion of spaces dedicated to horticultural therapy. Within the horticulture therapy garden, people are taught gardening techniques and brought in closer contact with nature in a guided, oftentimes group setting. The horticultural therapy garden also provides ample space for circulation and gathering around several built in benches. The benches are designed in a concave manner to facilitate conversation and social support. Additionally, the main circulation paths are designed to be wide enough to stroll through the garden with a companion while maintaining a conversation.

The simple decision to allow this garden to remain open to the public, by its very nature, promotes social interaction. Oftentimes, local photographers will use the space to take high school senior photographs and family photos. The project is very successful in providing opportunities for social interaction by creating intimate seating nooks at several points along major and minor circulation routes. Spaces to gather and eat have been provided within the garden for use by healthcare workers, patients, and the general public. There is a high degree of visibility within the formal zone of the project that allows users to survey the garden and feel

like they are part of a greater whole. This sense of prospect makes the garden a likely place for both intentional and unintentional meetings. The major circulation paths are designed to allow casual conversation as users stroll and explore the garden.

The decision to make the garden a public amenity activates the space throughout the day and night, and promotes social interaction between patients, workers, and the general public. The site remains busy with people walking dogs, jogging, and sitting along the newly constructed harbor walk. By limiting the amount of tall vegetation within the primary open spaces of the garden, a high level of visibility is maintained, enabling the garden to be easily understood and navigated. All of the benches used in the project are large enough to allow several users to converse and provide social support to one another. While the seating nooks are intimate enough to provide an introspective experience, they also allow small groups to gather and converse. A dining terrace adjacent to the primary rehabilitation space of the garden allows families, visitors, patients, and passersby to enjoy a meal in the comfort of a natural setting.

As this garden is accessible to the public, it creates opportunities for passive and active interaction between patients, workers, and the general public. A dining court complete with several moveable tables and chairs allows for communal activities to take place. The circulation paths have been designed to be

wide enough to permit a pair or trio of users to converse while they navigate the space. As users circulate through the site, the sculptural elements act as conversation pieces to initiate socialization. Benches arranged around the labyrinth allow for passive interaction through people watching, and the elevated nature of the labyrinth space in comparison to the rest of the site creates a heightened sense of prospect. Connections between users can be made across the site as vegetation does not infringe on overall visibility. This allows one to be aware of others within the space without feeling that there is competition to inhabit the space.

## **FAMILIARITY + SUITABILITY**

Natural native stone is incorporated throughout several of the subspaces within the garden, thereby allowing users of the garden to become more familiar with their regional surroundings. Ambiguity within the project is minimized by clearly defining circulation paths and entrances to the garden's subspaces. By crafting these spaces that are legible to their users, the garden allows users to feel more comfortable within their surroundings. Moreover, the garden is compatible for the intended users of the space as it provides ample opportunity for seating, strolling, and the viewing of nature.

To foster a sense of regional familiarity, native plantings are included throughout the garden. This native vegetation may allow locals to feel a sense of regional pride within the space as they recognize familiar plant material. As a whole,

the garden is easily legible through its coherent radial layout. This spatial legibility provides a sense of relief to those struggling with stress and directed attention fatigue. Art plays a large part in the healing experience of this project, and takes the form of clearly defined, recognizable sculptures of various plants and animals.

The coherent radial organization of the design allows the space to be easily read and understood by those both inhabiting the space and viewing it from above. All of the accessible spaces within the garden are clearly delineated by material changes to eliminate spatial ambiguity. Sculptural installations in the garden illustrate interpretations of the four natural elements that are familiar to many people.

Spaces within the garden respond directly to the human scale, generating compatibility and comfort. Several bronze sculptures of indigenous animals including herons, sandpipers, and jellyfish have been arranged throughout the garden and provide visual interest and delight to garden users. These sculptures depict concrete and recognizable images, and avoid significant abstraction to prevent misinterpretation by individuals who feel stressed out.



## CONCLUDING TAKEAWAYS

The Elizabeth & Nona Evans Restorative Garden illustrates how various functions can be separated into subspaces artistically. By creating a rich sequence of spaces that is discovered at the users' own pace, the garden affords a unique experience for all those who visit it. The high degree of spatial enclosure allows the garden spaces to remain very serene. Overall, this project reinforces the importance of creating fascination through sensory engagement.

The Garden of Healing and Renewal is very successful in its merger with existing site conditions. By taking advantage of the existing spatial character and vegetation, the project merges seamlessly with the history of the site. The subspaces within the garden are successfully organized as a series of intimate nodes connected to a main circulation spine. Overall, the variety of experiences one encounters within this garden provide a quality setting for healing.

The Spaulding Rehabilitation Hospital Garden successfully demonstrates how several related and unrelated functions can be programmed into a small amount of space. Within the garden, intimate subspaces are revealed and threaded together by pathways rather than being defined by the circulation routes. Overall, by creating a clear hierarchy of paths and spaces, the project is able to delineate an important hierarchy of public and private spaces.

The Mary and Al Schneider Healing Garden illustrates several creative design solutions to create a meaningful restorative space. Thoughtful consideration to the design of outdoor lighting in the garden enables the space to provide restoration and visual interest throughout the day and night while addressing site safety. Overall, the project provides a whimsical and artistic space for individuals to relax, reflect, and become restored in the city.

# ELEMENTS & DESIGN CONSIDERATIONS:

The experience of a landscape as a whole is defined in large part by the interactions between various interrelated human scale, tactile design features. The design of any garden, landscape, or outdoor space requires explicit attention to its contextual surroundings, intended function of the space, as well as the needs of site users. However, with that in mind, through systematic literature review several specific program elements and design considerations that are conducive to the creation of a restorative environment were identified. The factors range from tactile design features to planting principles, spatial functionality, and experiential qualities. These principles serve as the criteria for identifying findings based on the restorative landscape case studies described in previous pages. By identifying the elements and considerations that have been applied to each

of these four restorative garden case studies, the design of future restorative spaces will be enriched and better informed. This analysis does not by any means claim to be exhaustive of all restorative design features or solely responsible for the creation of a restorative landscape, but rather acts as foundational guide to inform future site scale design decisions. On the facing page, Table 2.6 illustrates a summary of the program elements and design considerations identified from this analysis. The information has been organized and labeled based on the number of cases that contain a given program element or design consideration in order to identify which are the most recurring. Furthermore, these elements and considerations have been categorized into the six major themes identified through literature review which will influence future design below in Table 2.5.

NATURE + STIMULATION	MOVEMENT + CONTROL	RICHNESS + VARIETY	INTROSPECTIVE + PERSONAL	SOCIAL + COMMUNAL	FAMILIARITY + SUITABILITY
Shade Trees	ADA Accessibility	Variety of Subspaces	Sense of Enclosure	Gathering Space	Legible Layout
Water Feature(s)	Walking Loop	Multiple Entrances	Protected Seating	Tables for Dining and Activities	Locally Sourced Materials
7:3 Ratio of Soft to Hard Surfaces	Moveable Seating	Variety of Views	Multiple Rooms	Programmed Activity Zones	Native Planting
Multi Sensory Planting	Hierarchy of Paths	Variety of Seating	Labyrinth	Balcony/Terraces	Positive Sculptural Elements
Accessible Lawn	Exercise Zones	Framed Views	Overhead Shade Structures	Orthogonal Forms	Artistic Night Lighting
Raised Planter Beds	Visual Landmarks	Curvilinear Forms/Paths		Horticultural Therapy Zones	Gateway

Table 2.5 Relationship Between Program Elements And Literature Themes | By Author

Program Elements & Design Considerations	Botanical Garden	Healthcare Gardens			Sums
	Elizabeth & Nona Evans Restorative Garden	Garden Of Healing And Renewal	Spaulding Rehabilitation Hospital Garden	Mary & Al Schneider Healing Garden	
Variety Of Subspaces	●	●	●	●	4
Multiple Entrances	●	●	●	●	4
Shade Trees	●	●	●	●	4
Multi Sensory Planting	●	●	●	●	4
Water Feature(s)	●	●	●	●	4
Legible Layout	●	●	●	●	4
Variety Of Views	●	●	●	●	4
Hierarchy Of Spaces	●	●	●	●	4
Multiple Rooms	●	●	●	●	4
Curvilinear Forms/Paths	●	●	●	●	4
ADA Accessibility	●	●	●	●	4
Walking Loop	●	●	●		3
Sense Of Enclosure	●	●		●	3
Gathering Space	●		●	●	3
Locally Sources Materials	●	●	●		3
Hierarchy Of Paths	●	●	●		3
Protected Seating	●		●	●	3
Variety Of Seating	●		●	●	3
7:3 Ratio Of Soft To Hard Surfaces	●	●	●		3
Native Planting		●	●	●	3
Positive Sculptural Elements		●	●	●	3
Artistic Night Lighting		●	●	●	3
Orthogonal Forms	●	●	●		3
Gateway		●		●	2
Tables For Dining & Activities			●	●	2
Moveable Seating		●		●	2
Accessible Lawn	●		●		2
Raised Planter Beds	●			●	2
Programmed Activity Zones	●		●		2
Labyrinth		●		●	2
Balcony/Terrace	●			●	2
Overhead Shade Structures	●				1
Visual Landmarks			●		1
Framed Views	●				1
Exercise Zones			●		1
Horticultural Therapy Zones	●				1

Table 2.6 Restorative Case Study Program Elements And Design Considerations | By Author



# CHAPTER SUMMARY

A wide variety of foundation knowledge related to the creation of an active and restorative university campus was systematically outlined and represented within this chapter. Conceptual and theoretical knowledge related to each primary project theme - campus design, physical and mental health, active transportation, and restorative landscapes was identified through a comprehensive review of existing literature. While the theories and concepts extracted from literature review prove to be very important in the definition of a design framework within Chapter 4, they lacked legible application to real world scenarios. To provide this translation and application, these conceptual findings were then substantiated through the analysis of three different types of built cases - campus street closures, bicycle infrastructure, and restorative landscapes. A rich body of knowledge that provides a wide range of application possibilities was the result of this process. The numerous findings identified within this seminal chapter are cross-referenced and further synthesized within subsequent chapters of this work to inform the creation of a framework to shape an active and restorative environment through campus street design.

Figure 2.51 (Opposite) Chapter Summary | By Author



03



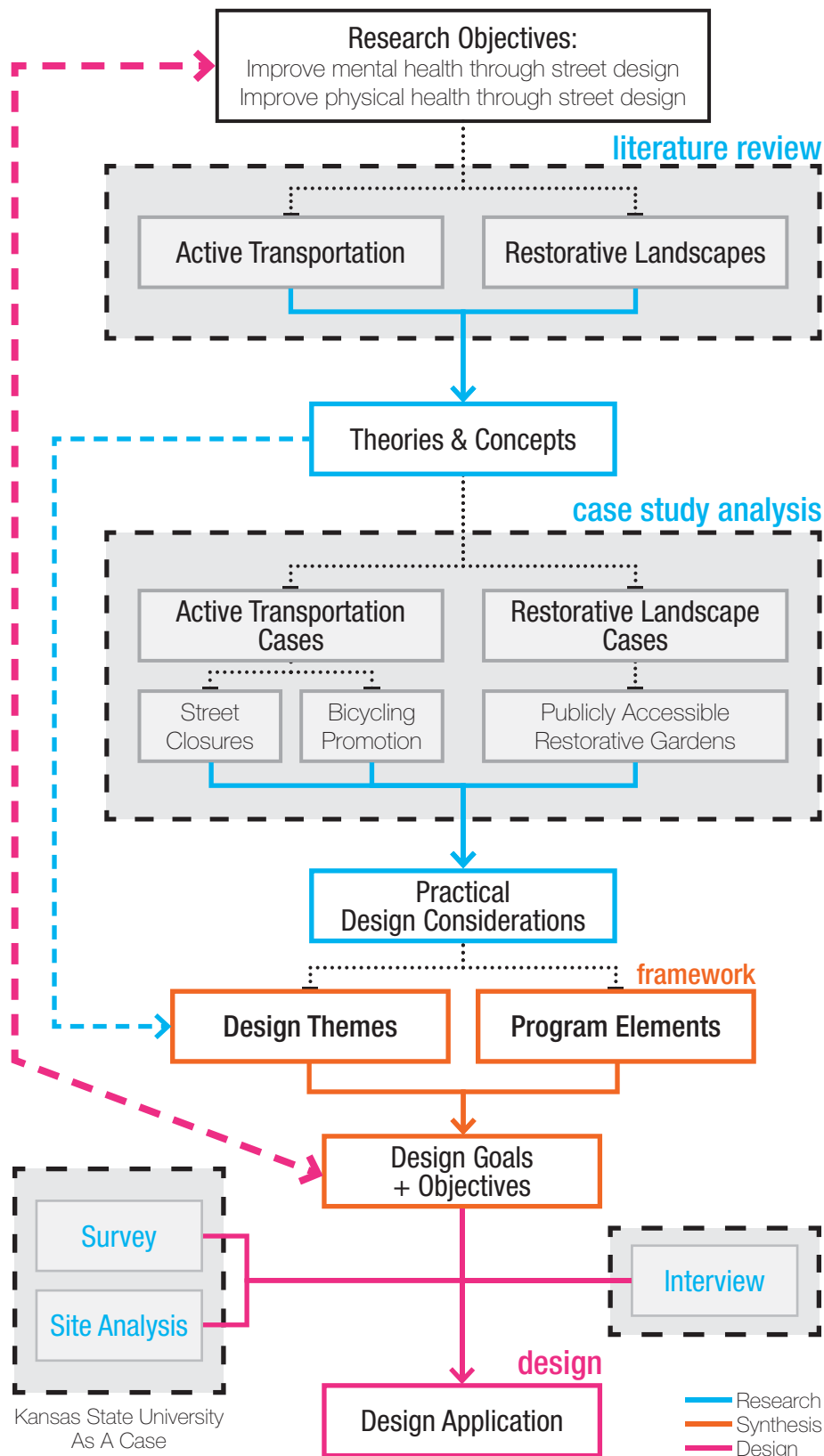
## METHODOLOGY

This chapter explains in further detail what specific methods were utilized to answer research questions previously identified in Chapter 1 of this report. The methodology involves both quantitative and qualitative measures that have been established to create a holistic understanding of the guiding principles required to create an active and restorative campus environment. Overall, this chapter rationalizes the connections that have been drawn between several forms of research and design inquiry.

# METHODOLOGY

## PATH OF METHODS

Project objectives are based in the promotion of mental and physical health within the student body of a university through the design of campus streets. The project methodology was established to answer the overarching research questions established in Chapter 1. This report approaches research through both quantitative and qualitative lenses at a variety of research and case specific scales. Literature review, the first feature of the six part methodology was initially undertaken to provide foundational background knowledge of several project related topics. Once this background was researched and outlined, the scope of the literature review expanded to examine design principles related to the creation of a restorative and active landscape. Case study analysis expands on the conceptual and theoretical nature of these findings by providing practical design considerations to apply to the creation of a holistic restorative and active design framework, the third facet of the methodology. This design framework establishes several design goals and objectives bases on synthesis of findings from methods discussed above. At this point in the methodology, the framework provides a tool to facilitate the creation of a restorative and active street within a variety of university campus contexts. The design framework is then further influenced by survey results of current students and site analysis conducted by the author at Kansas State University. Ultimately, this framework is applied at Kansas State University through a series of campus, corridor, and site scale planning and design decisions.



Kansas State University  
 As A Case

Figure 3.1 Project Methodology | By Author

INQUIRE

REVIEW

DISCOVER

ANALYZE

EXTRACT

RELATE

UNIFY

APPLY



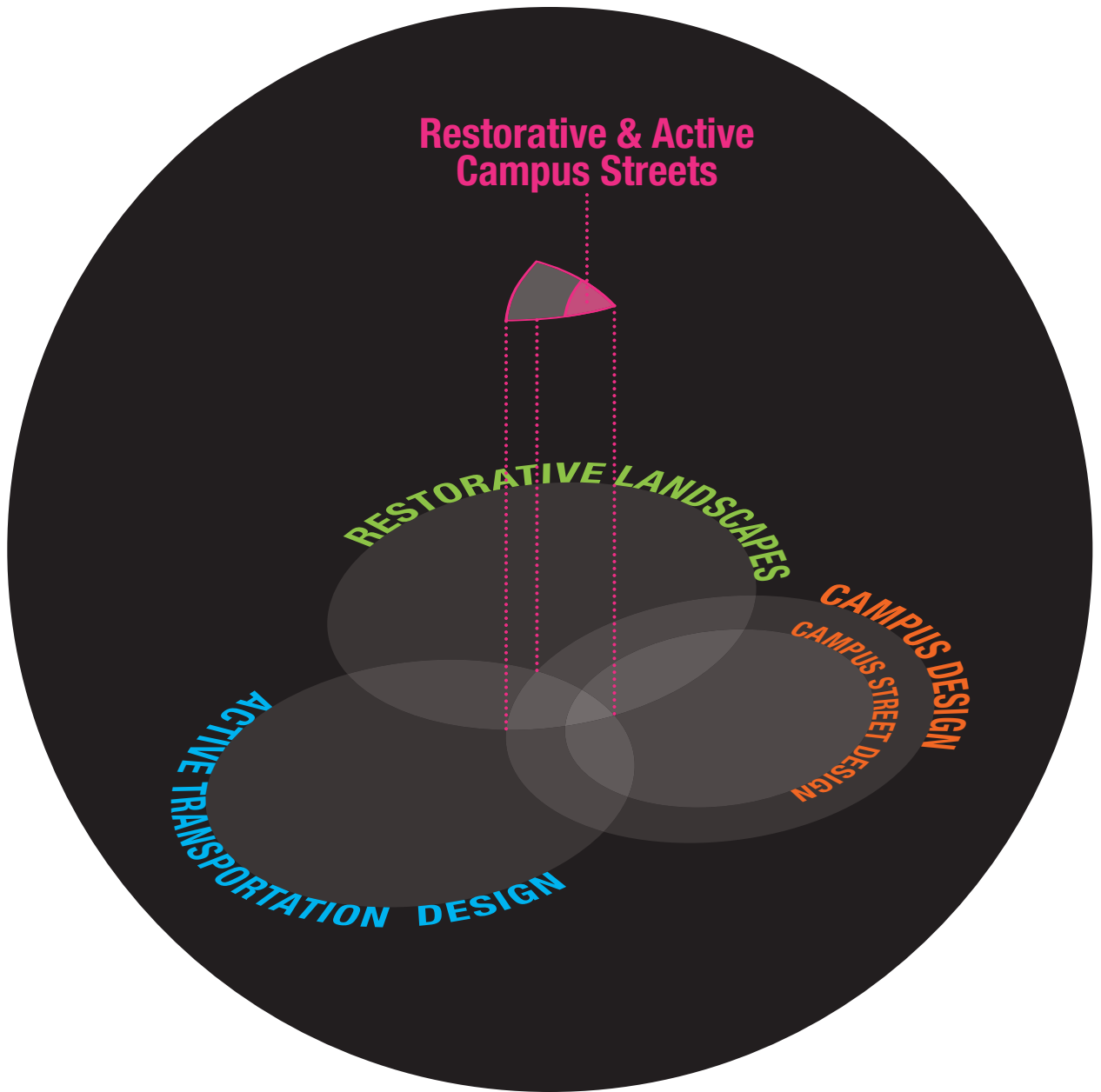


Figure 3.2 Project Thesis | By Author

## **METHOD 1: LITERATURE REVIEW**

To provide context to the previously identified dilemma of the physical and mental health of college students, a comprehensive literature review related to mental and physical health was undertaken. This review first identifies the relationship between stress, the built environment, and mental health. It then pinpoints and further describes the current mental health crisis on university campuses across the United States. Subsequently, the analysis recognizes the relationship between physical activity and physical health, and moreover identifies that walking and bicycling are appropriate activities to reach physical activity standards. This section serves as background to structure further literature review associated with changes to the built environment that promote mental and physical health.

One of the key requirements involved in completing this project involves developing a substantial understanding of the principles that inform the planning and design of restorative landscapes, university campus environments, and active transportation systems. Since the relationships between these three topics have not yet been explored in a research setting, the background knowledge and underlying theories associated with each topic have been appropriately defined and synthesized. After identifying theoretical foundations for the topics, the literature review shifts its focus towards identifying practical guidelines and solutions that inform a later design proposal. A review of campus design related literature identifies

several important principles that guide campus planning and design, explores current issues within the campus environment, and provides general background of the function and purpose of a university campus. Restorative landscape design and the inherent connections to the healing qualities of nature are then discussed from a theoretical standpoint and grounded in a growing body of research conducted over the last several decades. The review of restorative landscapes then shifts towards design application as specific recommendations identified within literature are called out and examined. Lastly, built environment changes that promote increased walking and bicycling are identified and discussed.

## **METHOD 2: CASE STUDY ANALYSIS**

Two types of built precedents, restorative landscapes and campus street closures, were selected for analysis within this project. The restorative landscape precedents are analyzed through six key restorative themes identified within the literature review and provide a better understanding of how to design successful restorative spaces. Additionally, specific design features identified through the literature within the restorative landscapes are called out and examined to determine which features contribute most to a successful restorative environment. Lastly, findings from examination of these restorative gardens are synthesized and then presented. These restorative garden precedents are intended to highlight examples of successful projects by understanding the impact of specific

built environment interventions. Several examples of campus street closures are then introduced, illustrated, and examined to further substantiate this report's argument for the power that closure of campus streets to vehicular traffic may hold. All of these precedents share the common goals of creating a more pedestrian friendly and unified campus environment, but accomplish these goals in several different ways. Overall, by analyzing these two immensely different types of built works, the project is able to better understand how a restorative landscape design may be applied within the context of a campus street closure.

### **METHOD 3: SURVEY**

A survey of students at Kansas State University was conducted to collect information related to students' mental and physical health, perceptions of campus environments, and stress levels while engaging in active travel behaviors within the campus environment. The survey was conducted online using the Qualtrics research platform between February 16, 2015 and March 1st, 2015. A total of 181 students participated in the survey during this 13 day period. Five hundred physical quarter sheets with an invitation to complete the survey were distributed in several academic buildings, the K-State Student Union, university libraries, and along campus pathways. The response rate for the survey was 36.2%, an acceptable rate for the purposes of this study. Student identity was kept completely anonymous during the survey and subsequent data analysis to meet IRB standards. Participation in the survey was encouraged by providing one \$25 gift card to

a randomly selected participation after the survey process. The survey findings assist in justification of the selection of a street within the greater Kansas State University campus to explore a site scale designed solution within. While many of the specific results from the survey are not particularly relevant to the creation of a design framework to promote physical and mental health, they help validate the overarching decisions made throughout the research and design process of this project. These results are therefore included where relevant throughout this report, and do not justify their own chapter or section for further analysis. An improved understanding of students' campus use habits and desires for changes or additions to the outdoor campus environment help ground the design goals that were established later in the project. Overall, the survey provides relevant campus specific information that allows more contextually sensitive active and restorative design to take place.

Relevant findings from the survey within the report are demarcated by this symbol:



### **METHOD 4: SITE SELECTION AND ANALYSIS**

To better understand the current state of the Kansas State University campus, site analysis was undertaken at both a campus wide scale and a more constrained site scale. As the author completed this work while studying at Kansas State University, analysis of the campus through



observation was completed on a continual basis throughout the Spring of 2015. This degree of proximity to the site and familiarity of the context was invaluable as planning and design decisions progressed. Campus and community base data in the form of AutoCad drawing files and GIS databases was provided by the Campus Planning & Facility Management Department of Kansas State University and Riley County Community GIS respectively. Campus scale analysis identified major campus gateways, circulation patterns of various travel modes, open space networks, topography, and the current affordances associated with walking and bicycling through the campus.

The Kansas Department of Transportation (KDOT) was contacted in January of 2015 to acquire recent pedestrian and bicycle accident data within Manhattan, Kansas. Data collected between January of 2000 and December of 2014 was made available for further geospatial analysis. The data from the year 2014 is considered incomplete and unofficial, but is used within this analysis regardless. The data was provided in Excel format and provides information related to the type of accident (pedestrian vs bicycle), location of the accident (latitude and longitude coordinates), as well as the environmental conditions at the time of the accident (weather, time of day, lighting, etc...). All accidents reported in these cases involved a vehicular conflict with a pedestrian or bicyclist. Accidents that occur between pedestrians and bicyclists are unfortunately not recorded in any databases identified by the author.

The accidents that occurred either within the Kansas State University campus or along its bounding streets and intersections were then extracted from the overall data set for the city of Manhattan. Of the 422 accidents reported within the city limits between 2000 and 2014, 110 (26.0%) were either within the Kansas State University campus or along its bounding streets and intersections. Within the sample of 110 campus accidents, 46 involved conflict between a bicyclist and automobile and 64 involved conflict between a pedestrian and automobile. Interestingly, 72 of the accidents transpired in full daylight, 33 occurred after sunset, and 5 took place during either dawn or dusk. Fortunately, none of these accidents were fatal.

After campus accidents had been filtered out of the data set, the data was prepared for spatial analysis within ArcGIS 10.2 by exporting accident type, latitude, and longitude data to .csv format. The geolocation toolset within ArcGIS was used to project this raw data into a previously defined spatial reference. Once the data was imported and saved as a feature class, background research was identified methods to analyze spatial relationships resulting hotspots between the 110 accident datapoints scattered throughout the campus. The “kernel density” spatial analyst tool within ArcGIS is used to calculate a magnitude per unit area of the accident point features which is output as a smooth tapered surface (ESRI, 2014) to easily visualize the density of pedestrian and bicyclist conflicts with vehicles within Kansas State University’s campus.

The algorithm used to define the density of points is defined as follows:

- “1) Calculate the mean center of the input points.
- 2) Calculate the distance from the (weighted) mean center for all points.
- 3) Calculate (weighted) median of these distances,  $[D_m]$ .
- 4) Calculate the (weighted) Standard\_Distance,  $[SD]$ .
- 5) Apply the following formula to calculate the bandwidth:

$$SearchRadius = 0.9 * \min \left( SD, \sqrt{\frac{1}{\ln(2)} * D_m} \right) * n^{-0.2}$$

where:

$SD$  is the standard distance

$D_m$  is the median distance

$n$  is the number of points”

(ESRI, 2014, p. 1)

A clearly legible symbology is then applied to the output of this analysis, and design analysis, site selection, and further conclusions can be made. This analysis at the campus scale, paired with results from survey data discussed above, and current plans to redevelop Mid-Campus Drive are cross referenced to inform the site selection for this project. At the corridor scale, building functions and entrances, active transportation affordances, restorative landscape qualities, and opportunities and constraints were explored. By understanding the site conditions and surrounding context, a more contextually grounded and appropriate design solution was crafted.

## METHOD 5: INTERVIEW

An unstructured, informal interview with the Kansas State University Architect and Associate Vice President For Campus Planning, Ryan Swanson was conducted to develop a better understanding of current campus planning and

construction projects. The campus is undergoing a great deal of transformation over the course of the next several years, and the author sought to synthesize knowledge related to these projects. Discussions regarding the chilled water master plan and several building projects were extremely enlightening and project documentation shared by Swanson allowed further analysis of the campus’ existing plans. Findings from this interview grounded the design of this project in a higher degree of realism.

## METHOD 6: DESIGN FRAMEWORK

Two seemingly independent design frameworks have been established through the union of literature review and case study findings. Synthesis of literature findings related to restorative landscape design and major discoveries from the restorative landscape case study analysis informs the creation of a framework to guide design decisions at the site scale. Site scale design, for the purposes of this project, is defined as the design of human scaled spaces with perceived boundaries, which facilitate specific functions and activities. Several recurring themes were identified within the restorative landscape literature and subsequently classified to categorize design decisions as they pertain to each theme. The literature review provided substantial conceptual and theoretical knowledge to frame practical design considerations relating to spatial character and the use of specific program elements extracted through the case study analysis. Descriptions of specific physical design applications that apply the six categories of conceptual knowledge accumulated through literature review ground the framework and allow

straightforward translation of theory to practice. A second framework developed in unison with the framework described above informs campus planning and design decisions made at the campus and corridor scale. For the purposes of this project, campus scale design is defined as design which intends to shift campus wide systems, flows, and spatial organization. Corridor scale design describes design of an individual circulation route within the greater campus environment that consists of a vehicular street, defined visual extent, and a degree of enclosure provided by adjacent building masses. This scale of space is perceived through movement at various paces, and has the potential to shape a memorable experience as users circulate through and across it.

The framework to promote physical activity through active transportation is once again framed by theories and concepts identified through literature review, and then grounded in practical design solutions devised through case study analysis. The primary design move accomplished through this framework occurs at corridor scale and involves the closure of a campus street to day-to-day vehicular traffic. Case study analysis of four campus street closures and subsequent conversion to pedestrian malls inform the direction of design at this scale. Several additional recommendations at both the corridor and campus scale are made based off of two additional active transportation promoting case studies and literature review findings. These recommendations operate at a systems planning level, and influence students' movement patterns through provision of increased active transportation affordances

within the campus environment.

## **METHOD 7: DESIGN APPLICATION**

The research questions set forth in the first chapter of this report are ultimately addressed through the application of a designed solution within the campus of Kansas State University. As mentioned previously in the report, Kansas State University was selected for design investigation based on its representative standing as a typical university campus environment and proximity to the author. As the first established land grant university in the United States (Weisenburger, 1973), Kansas State has a unique opportunity to set an example of how the physical campus environment can promote mental and physical health to other similar institutions across the country.

Design decisions informed by the design framework are made at the three scales (campus, corridor, and site) defined previously. The chapter illustrating this design application describes and rationalizes major decisions made at each scale separately. The closure and conversion of the Mid-Campus Drive corridor is the focal point of the design application and therefore receives the most detailed attention. Following this scale segregated design approach, a series of diagrams describes how the objectives at each scale relate to one another to create a active and restorative campus. The final product of this design application is realized and visualized through a series of illustrative drawings and diagrams at the campus, corridor and site scale. Overall, the project methodology has concluded in a multi-faceted designed solution that answers the project's initial research questions.



04

## SYNTHESIS

The restorative and active design frameworks are established within this chapter of the report. Findings from the comprehensive literature review and case study analysis are united to create two separate design frameworks that inform all future design and planning decisions regarding active and restorative landscape design. Theoretical and conceptual foundations are translated into distinct design considerations and recommendations that are applied in the forthcoming chapter.

# FRAMEWORK PHILOSOPHY

The literature review and case study analysis portion of this project identified quite clearly that the role of a built environment which promotes physical activity through active transportation are not entirely parallel with the components of an environment that promotes restoration. As this project explores the potential connections between creation of a mentally restorative and physically active environment, it is imperative to synthesize the vast body of knowledge that exists related to both realms. While the promotion of both of these goals may initially appear to be an unrelated juxtaposition of concepts, the moderating effect between physical and mental health outcomes substantiates the argument for a designed solution to address both.

In order to simplify this synthesis and allow the most legibility in design application, this synthesis is undertaken in the form of two related design frameworks. One framework describes design decisions related to active transportation while the other examines the application of knowledge collected regarding restorative landscapes. These two frameworks act together within the campus environment to shape an environment that promotes both mental and physical health of students as they circulate through and interact with the campus landscape.

First, a design framework to inform active transportation design decisions is structured based on the literature review and case study analysis described in Chapter 2. Five foundational themes were identified through this analysis to organize design considerations. This framework identifies specific design strategies within the five themes that can be applied to a campus environment to promote physical activity through increased modal share of walking and bicycling as physically active forms of transportation. This framework is structured around the overall design goal of creating a calm, social, and attractive human scale environment to encourage walking and bicycling within the university campus. The proposed closure of a campus vehicular street and subsequent conversion to a pedestrian “garden street” acts as the primary design move to accomplish this goal, but is also supported by a series of other related design moves at several scales described on the following pages.

Secondly, a design framework that distills knowledge collected through literature review and case study analysis of restorative landscape theory and design is constructed to structure design decisions that allow restoration to occur. Six key themes identified through the literature review and analysis of built cases are used to organize more specific design considerations



and programmatic features that are conducive to a restorative setting. Each of these themes is important to the overall construction of a restorative setting, however, the importance of spatial variety was emphasized in countless sources analyzed within the literature review. Therefore, a design framework for restorative landscapes must provide a degree of variation and flexibility to allow this spatial diversity to emerge within a built environment. This is accomplished through the establishment of a series of restorative landscape archetypes with varying degrees of response to each of these six major themes. The archetypes act as a spatial typology that when distributed along a linear greenway (such as a converted garden street), can provide a richness of experience and functionality to college students seeking out opportunities for mental restoration within a natural environment. Overall, the restorative landscape design seeks to shape a series of unique and meaningful experiences as an individual moves through the space for both leisure and transportation purposes.

Lastly, as these frameworks have been developed independently, it is vital to clearly rationalize the connections between each realm of thought as they are applied to the campus landscape. The linkage between these two discrete frameworks is established to allow translation

and unity of design principles and benefits of the individual frameworks to occur. This linkage is accomplished based on the identification of the appropriate physical design scale responses for both frameworks and subsequent relationships between the key themes identified within each framework. By providing a physical and theoretical “glue” to bind both frameworks, the outcomes of the project are further solidified. The physical scale based method that unifies the frameworks is introduced first to clearly define and describe the relationships between them.

# FRAMEWORK UNIFICATION

## NESTED SCALES OF DESIGN

Design decisions made at three distinct scales enable the unification of the active and restorative frameworks described in the preceding spreads. The campus scale describes, as the name implies, design at the university campus wide level and examines issues related to vehicular, pedestrian, and bicycling circulation routes. Corridor scale design addresses the design of an individual vehicular street and adjacent spaces framed by building masses within a university campus core. Corridor scale design examines the major programming, circulation, and experiential decisions that define the frame which the last scale of design is nested within. The corridor scale design decisions are extremely important as the majority of users of this restorative space will experience it while walking for either pleasure or transportation purposes. Thus, designing spaces which provide restoration to both static and moving users is a key concern within the corridor scale considerations. Lastly, site scale design explores the specific spatial structure and layout of reclaimed campus corridor spaces as well as the inclusion and arrangement of relevant restorative program elements. This final scale investigates how general programming concepts derived at the corridor scale can be given a physical form to afford restorative experiences to users. The tactile, human scale experience of the subspaces is a key consideration at this level of design. While design is approached at several scales, a great degree of thought must be invested to the many connections that exist between the scales of design as users experience the space.

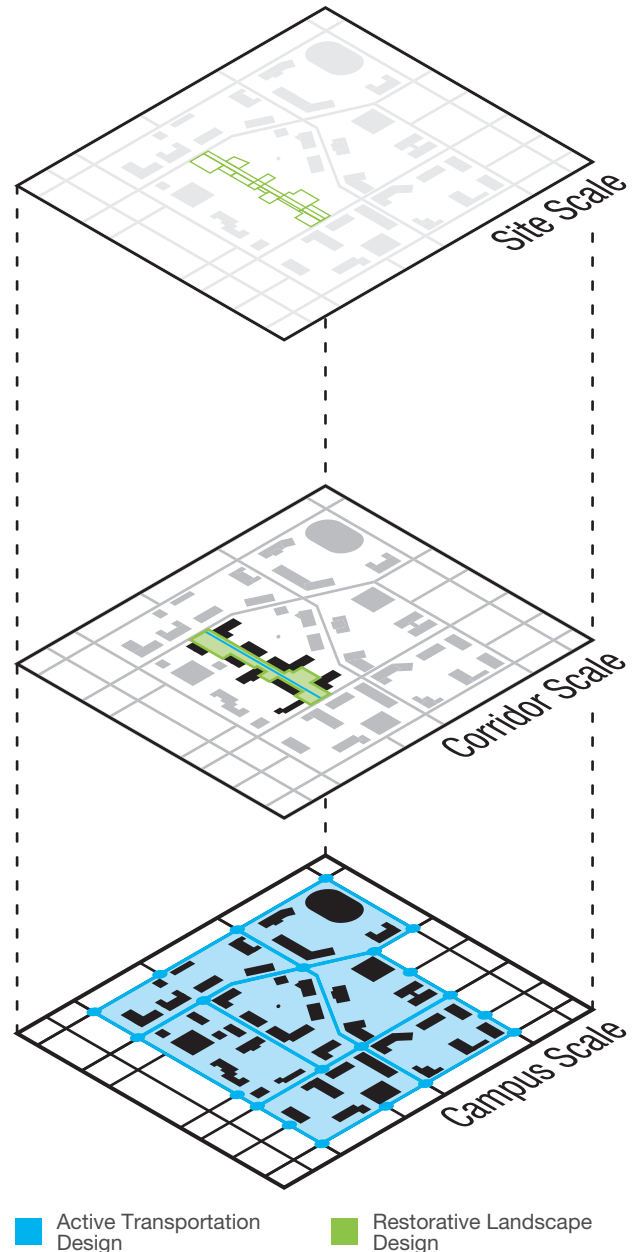
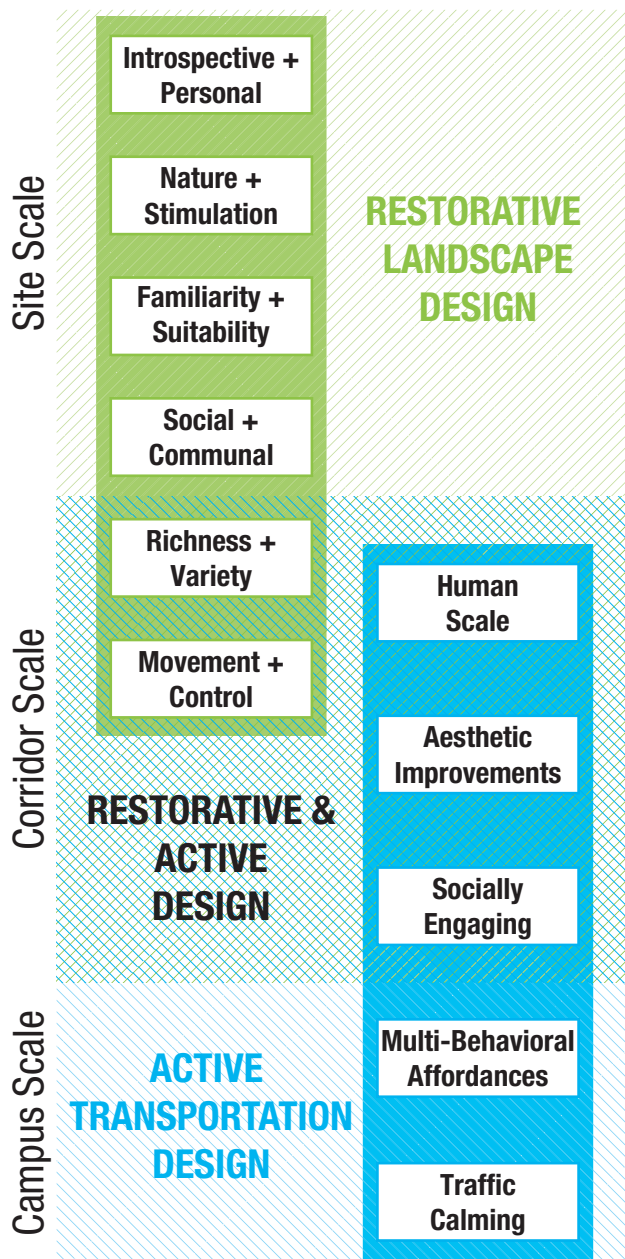


Figure 4.1 Nested Scale of Design | By Author



## RESTORATIVE + ACTIVE UNIFICATION

The importance of sensitivity to various scales of design has been clearly outlined on the facing page, however it is important to note that design at three scales is also used to unite the two frameworks described earlier in this chapter. At the campus scale, design is related to promotion of active transportation through traffic calming techniques and providing affordances for multiple active travel behaviors. This scale of design involves primarily diagrammatic master planning to outline opportunities to create a more active campus as a whole. The three active transportation objectives identified through case study analysis allow active transportation design to bridge scales and dictate programming, aesthetic qualities, and scale of corridor scale spaces. Additionally, the corridor scale of design is where initial restorative landscape considerations are made as shown in Figure 4.5. Strategies related to promoting movement and control offer opportunities for meaningful connections to the active transportation thoughts linked with street closure at this scale. By creating an aesthetically pleasing and human scaled “garden street” with pockets of social activity along this corridor, the principles of restorative and active design are bound together in an evocative and functional way. At the site scale, design to shape a restorative environment is the exclusive consideration as the major physical activity promoting moves have already been addressed at the corridor scale. The human experience of each space as well as the experience of transition between various spatial types will shape the space’s restorative potential.

Figure 4.2 Framework Relationships Across Scales | By Author



# ACTIVE TRANSPORTATION FRAMEWORK

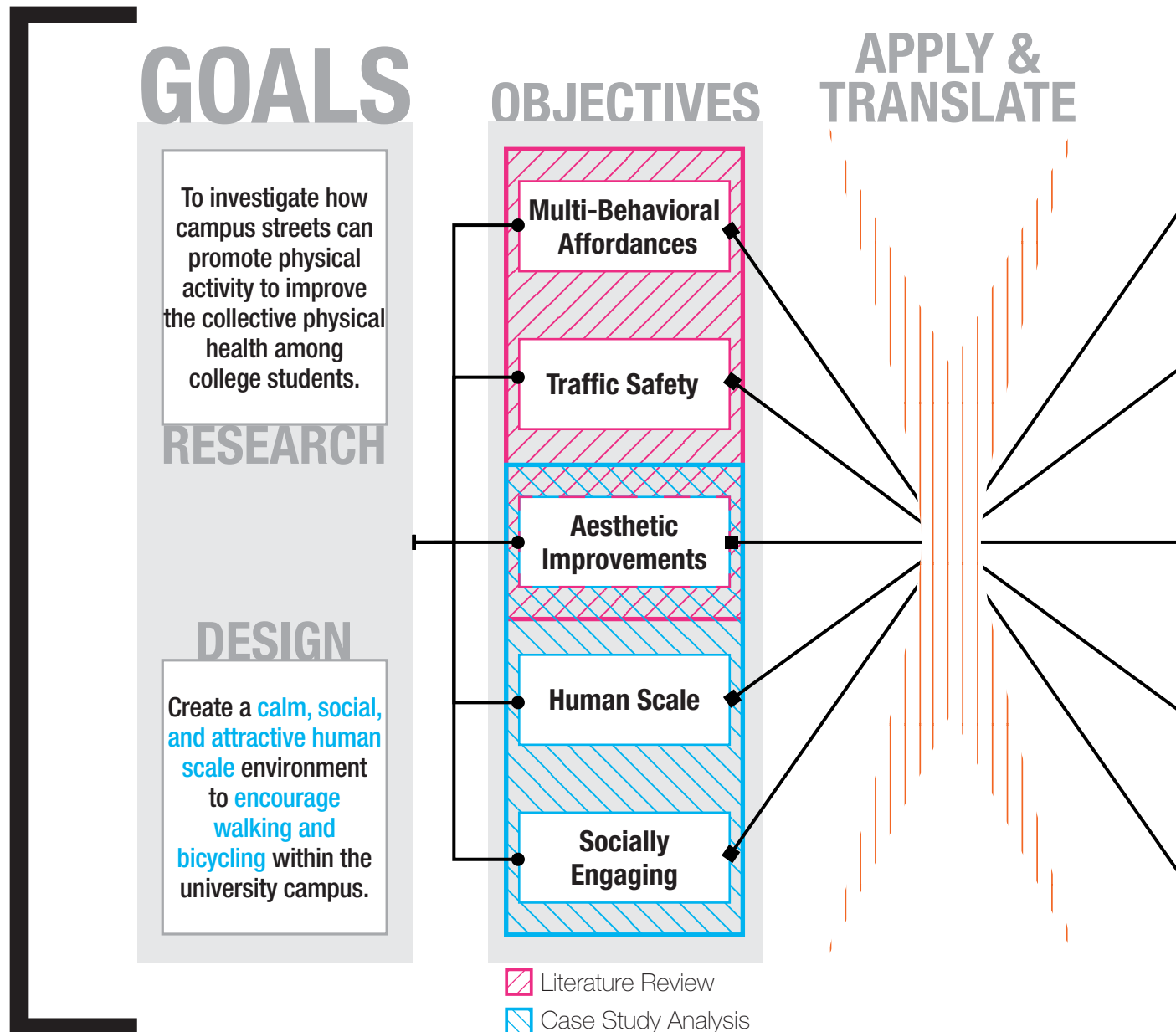


Figure 4.3 Active Transportation Framework | By Author

# OBJECTIVE BASED DESIGN STRATEGIES

## Multi-Behavioral Affordances

- Install Bicycling Infrastructure
  - Separated 2 way path
  - On street painted lanes
- Improve Walking Environments
  - Expand sidewalks
  - Calm movement zones
- Infrastructure Responding To Behavior Type
  - Improve Multi-Modal Transit System
    - Provide protected bus shelter
    - Create bus pull out zones
  - Provide bicycle share system
  - Install covered bicycle parking

## Traffic Safety

- Street Diet
  - Bicycle lane additions
  - Expand sidewalks
  - Vegetative buffers
- Tighten street corner radii
  - Slow turning vehicles
- Street Closure
  - Service + Emergency access
  - Operable Bollards
- Install Speed Tables
  - Intersections & mid-block crossings
  - Material change designates pedestrian space

## Aesthetic Improvements

- Trees + Attractive Plantings
- Engaging Paving Patterns
- Context Sensitive Material Choices
- University Branding
- Water Feature(s)
- Raised Planting Beds
- Gateway(s)
- At Grade Planting Beds
- Variety of Materials
- Diversity in Spatial Enclosure

## Human Scale

- Removal Of Vehicular Traffic
- Pedestrian Scale Lighting
- Legible Circulation Routes
- ADA Accessibility
- Retractable Bollards
- Bicycle Racks
- Visual Landmarks
  - Sculptural Elements
  - Framed Views
- Space Must Provide A Unique Programmed Experience
- Walls & Vertical Elevation Relief Relates To Human Size

## Socially Engaging

- Extended Sight Lines & Legibility
- Benches
- Intimate Gathering Spaces
- Tables
- Informal Seating
- Separation Through Elevation Change
- Multi Functional Plaza Space
  - Programmed Zones
  - Unprogrammed Zones
- Flexible Lawn Space To Allow Recreation
- Programmed Events, Concerts, And Student Forums
- Access To Dining And Picnicking Spaces

# RESTORATIVE LANDSCAPE FRAMEWORK

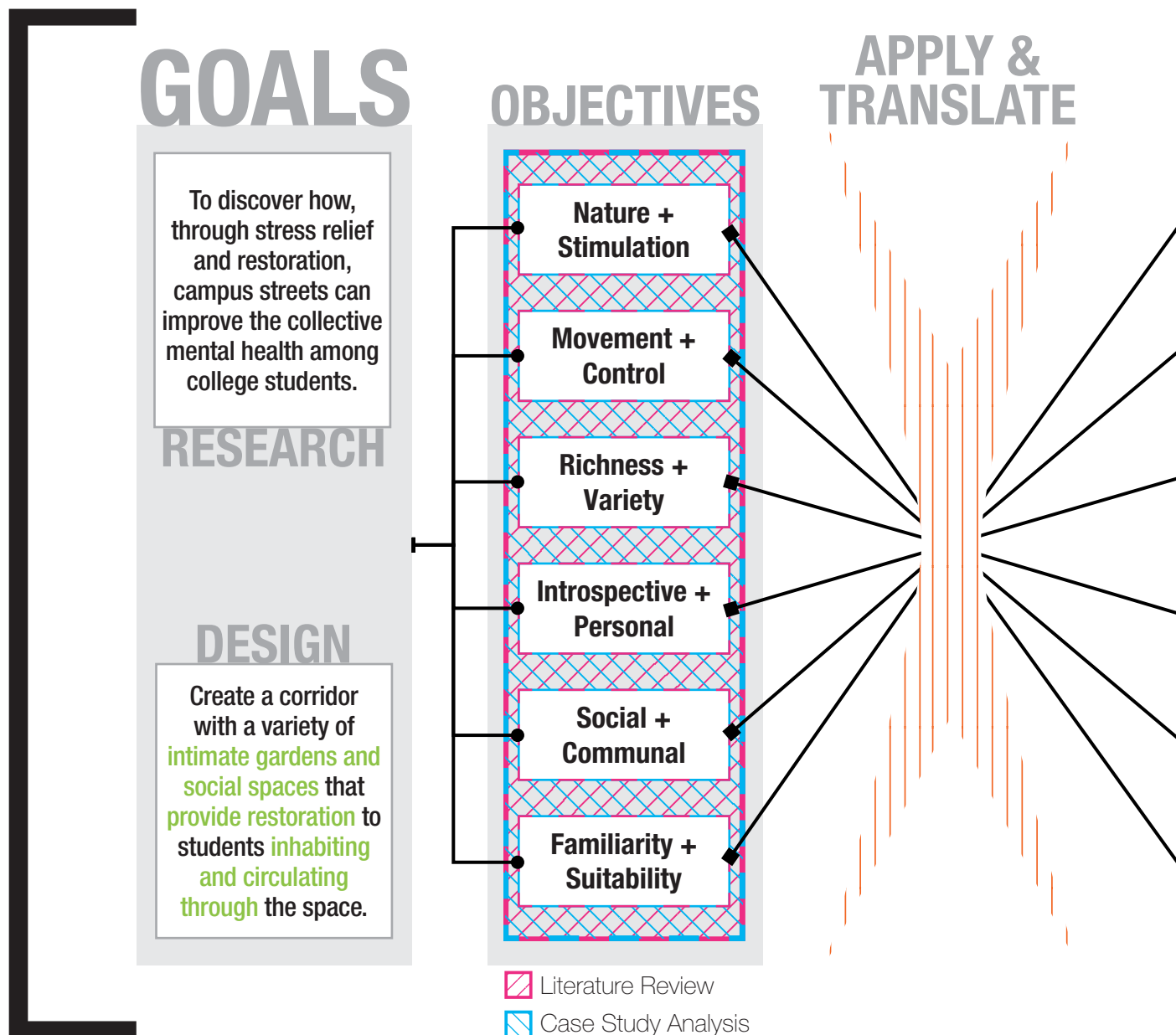


Figure 4.4 Restorative Landscape Framework | By Author



# OBJECTIVE BASED DESIGN STRATEGIES

## Nature + Stimulation

- Shade Trees Provide Interest & Shape Space
- Water Feature(s) Act As Pleasant Distraction
- Provide 7:3 Ratio of Soft to Hard Surfaces
- Multi Sensory Planting Engages Users
- Accessible Lawn Allows Many Functions
- Raised Planter Beds Allow Interaction With Plants
- Choose Plants To Attract Wildlife As Distractions

## Movement + Control

- ADA Accessibility Increases User Comfort
- Walking Loops Encourage Exercise
- Moveable Seating Allows User Control
- Hierarchy Of Paths Enables Choices
- Exercise Zones Promote Physical Activity
- Visual Landmarks Allow Navigation Of Space
- Boundaries Between Spaces Provide Clarity

## Richness + Variety

- Variety Of Subspaces Allow Interaction
- Multiple Entrances Contribute Richness
- Variety of Views Shapes Dynamic Experience
- Variety of Seating Enables User Choice
- Framed Views Entice Users To Explore
- Curvilinear Forms/Paths Provide Sense of Mystery
- Layered Plant Materials Create Visual Complexity

## Introspective + Personal

- Sense of Enclosure Provides Refuge
- Protected Seating Increases Comfort
- Multiple Rooms Allow Users To Claim Space
- Labyrinth Enables Personal Meditation
- Overhead Shade Structures Create Intimacy
- Sound/Wind Barriers Limit Detrimental Distractions
- Limited Material/Plant Palette Enables Contemplation

## Social + Communal

- Gathering Spaces Allow Conversation
- Tables Enable Dining + Studying With Others
- Programmed Activity Zones Engage Users
- Balconies/Terraces Provide Prospect
- Orthogonal Forms Can Define Social Plaza Spaces
- Clear, Expansive Sight Lines Allows Recognition
- Horticultural Therapy Zones Allow Social Teaching

## Familiarity + Suitability

- Legible Layout Increases User Understanding
- Local Materials Connect To Context
- Native Planting Is Familiar And Meaningful
- Positive Sculpture Engages User Imagination
- Artistic Lighting Shapes Mood And Allows Night Use
- Gateway Gives Space Identity And Defines Purpose

# RESTORATIVE LANDSCAPE FRAMEWORK

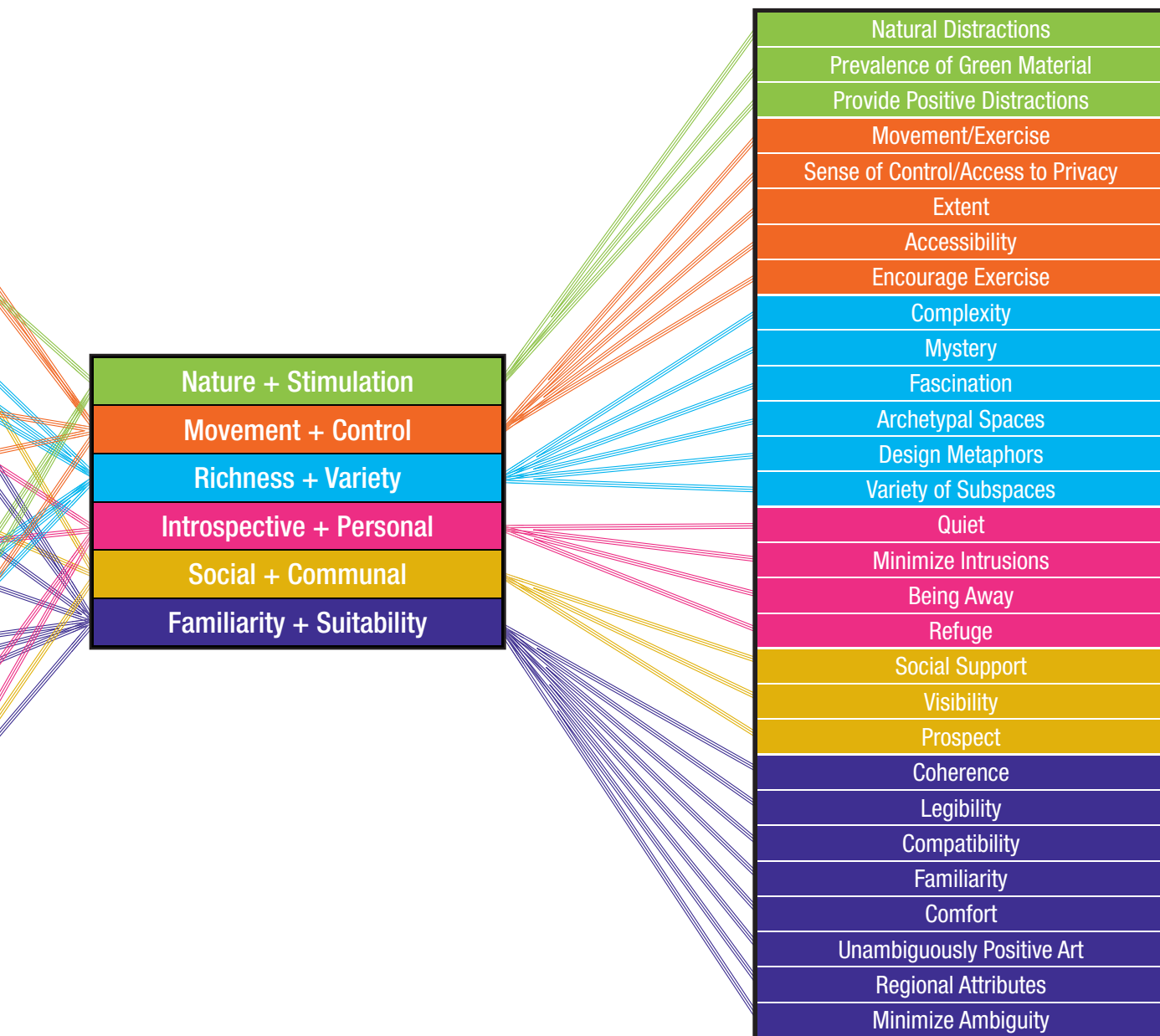
## *SYNTHESIS OF LITERATURE THEMES*

After review of restorative landscape literature was completed, it was recognized that while all of the information was pertinent; it presented little value unless further synthesized. This synthesis was accomplished by identifying common themes between six seminal works that discuss restorative landscapes, environmental psychology, and human evolutionary preferences. This theoretical and conceptual information of the six sources was identified as being most relevant based on its level of acceptance and familiarity within several dozen other works describing restorative landscapes. Each of the principles shown at right was written on a note card with a brief description of its meaning, and scattered across the authors desk.

Through extensive identification of common principles and several rounds of sorting these principles, six overarching themes were discovered within the literature. The themes define key spatial and experiential qualities of successful restorative spaces as explained by several well respected authors. By classifying this information into six themes, design decisions can be more easily structured and related to an audience not familiar with restorative landscape design. All six themes aligned with findings from the previously discussed case studies, and were therefore used to link practical design strategies and considerations identified within four built works with the restorative theory. This pairing of literature review and case study findings serves as the foundation for the creation of a restorative landscape design framework. This design framework is intended to simplify design decisions related to the creation of a restorative landscape.

Ulrich (1999)	Movement/Exercise
	Sense of Control/Access to Privacy
	Social Support
	Natural Distractions
Kaplan et al. (1998)	Coherence
	Complexity
	Legibility
	Mystery
Kaplan (1995)	Fascination
	Being Away
	Extent
	Compatibility
Cooper Marcus (2007)	Visibility
	Accessibility
	Familiarity
	Quiet
	Comfort
	Unambiguously Positive Art
	Archetypal Spaces
	Design Metaphors
	Regional Attributes
	Variety of Subspaces
Cooper Marcus & Barnes (1999)	Prevalence of Green Material
	Encourage Exercise
	Provide Positive Distractions
	Minimize Intrusions
	Minimize Ambiguity
	Prospect
Appleton (1975)	Refuge

Figure 4.5 Restorative Landscape Literature Synthesis | By Author





# RESTORATIVE LANDSCAPE FRAMEWORK

## *SPATIAL ARCHETYPES*

### THE POWER OF SPATIAL ARCHETYPES

The term archetype is oftentimes used to describe a recurring symbol or motif within works of literature, painting, or mythology. An archetype broadly describes a standardized or recurring theme that transcends cultural boundaries. More specifically, spatial archetypes describe forms found in both natural and built environments which elicit a similar response from humans regardless of region, culture, and traditional backgrounds. By operating at a fundamentally foundational human level, the archetypal concept allows meaningful relationships to be developed between content and consumer. Therefore, they provide immense relevance in the development of a restorative landscape design framework as academics and design professionals alike seek out ways to predict human responses to the built environment.

These archetypes recount patterns in the environment that inspire profound feelings of wonder and awe shaped through the medium of landscape and architectural interventions. Many of the responses to these spatial archetypes occur within the deep subconscious and are read and expressed by experiencing a particular space (Sinha, 2006). Meaning, value, and delight are often prescribed through the subconscious perception or reading of the forms and features that define or exist within a given space. Several examples of spatial archetypes have been documented and described by various authors in fields ranging from sociology and psychology to architecture and landscape architecture.

For instance, Julie Moir Messervy identifies spatial archetypes that afford a wide range of mental and physical human responses based on their ability to connect to memories or associations with past settings (Messervy, 2007). She describes seven unique archetypes which are grounded in humans' primal connection with the landscape and desire to achieve security, protection, and connection. Each of the seven archetypes provides a range of affordances related to the theoretical foundation of restorative landscapes identified through literature review such as prospect, refuge, mystery, legibility, etc... These spatial archetypes are illustrated on the facing page in a simple diagram examining the relationship of the consumer of the landscape (human) with the setting (content).

Messervy's seven archetypes were used as the basis for the author's own definition of restorative landscape archetypes described within the next several pages. These spatial archetypes can then be carefully programmed within a former campus street corridor in order to structure a dynamic, mentally restorative, and physically active experience. Each archetype carefully responds to all nine restorative and active themes prescribed for consideration at the site and corridor scale in Figure 4.5 on the previous page. However, the level of attention to each of the themes varies between archetypes based on the specific programmatic requirements and spatial character envisioned for such a spatial type. The archetypes provide a clear, legible opportunity to illustrate how specific design principles, considerations, and programmatic elements are incorporated.

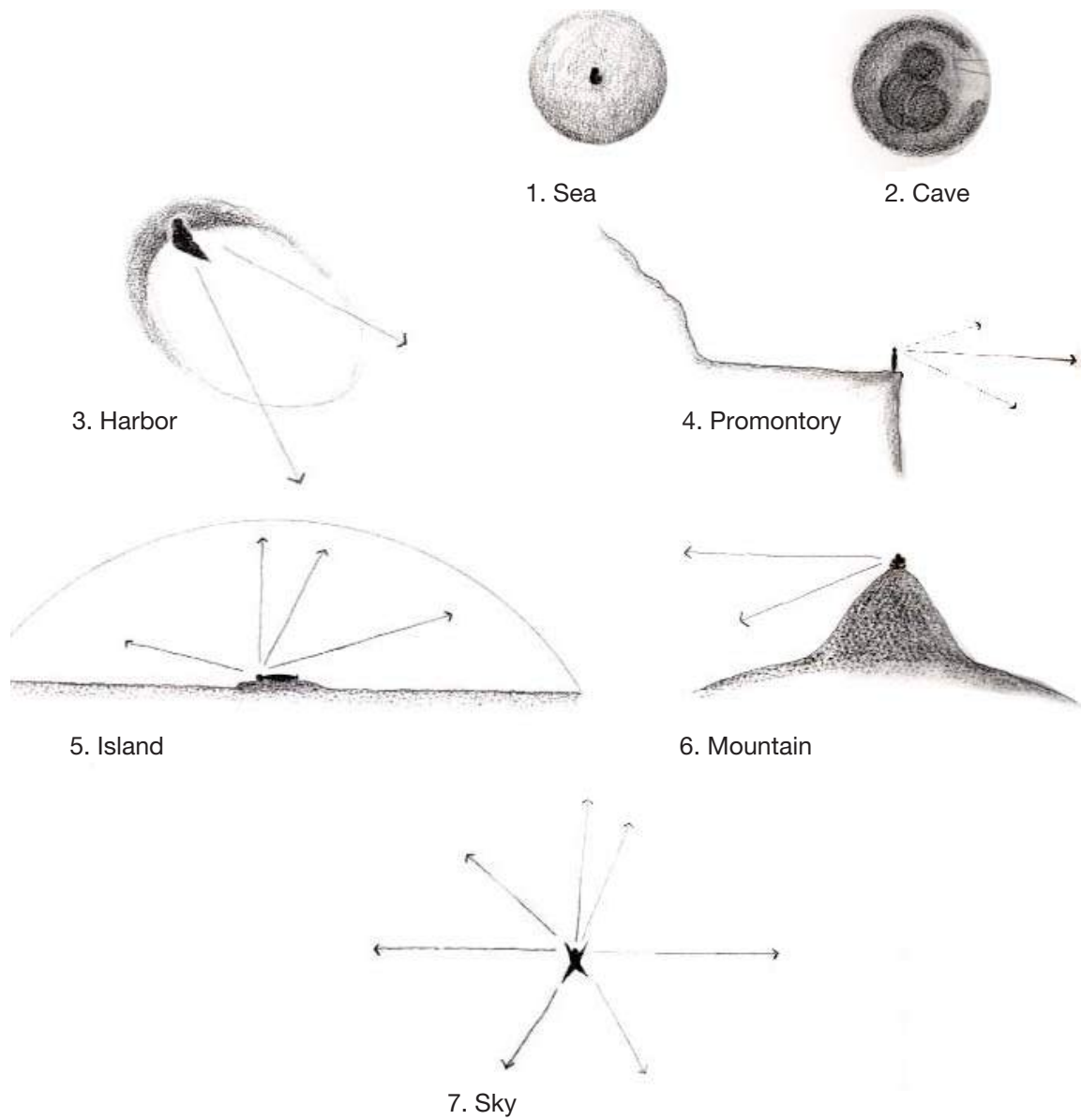
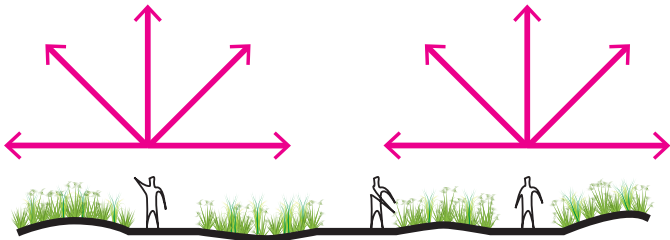


Figure 4.6 Concept Sketches Of Spatial Archetypes | (Messervy, 2007)

# BRAID



**Brief Description:** The braid archetype most closely emulates a wild meadow-like setting and is defined by a series of intimate meandering trails that allow users to navigate the expansive and outwardly focused space at their own pace. Views outward and upward are emphasized.

**Spatial Character:** The space feels uncontained and free of any major human intervention to allow users to explore a piece of natural wilderness within the campus setting.







**Functions/Activities:** Strolling, bird watching, sitting, reflecting, reading, napping, and flower collecting

**Appropriate Context:** This type is most appropriate adjacent to campus streams and natural amenities

**Spatial Enclosure:** Very low

**Sensory Stimulation:** Medium

## Archetype Connection To Key Themes:

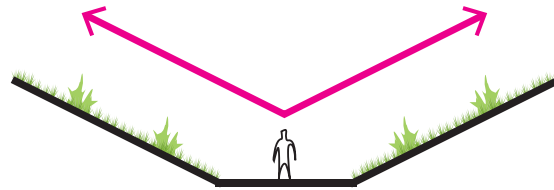
NATURE + STIMULATION	MOVEMENT + CONTROL	RICHNESS + VARIETY
NATURAL DISTRACTIONS PREVALENCE OF GREEN MATERIAL 	SENSE OF CONTROL /ACCESS TO PRIVACY EXTENT ACCESSIBILITY 	MYSTERY FASCINATION 
INTROSPECTIVE + PERSONAL	SOCIAL + COMMUNAL	FAMILIARITY + SUITABILITY
QUIET MINIMIZE INTRUSIONS BEING AWAY 	SOCIAL SUPPORT VISIBILITY 	COHERENCE REGIONAL ATTRIBUTES MINIMIZE AMBIGUITY 

 = LOW DEGREE OF RELEVANCE
  = HIGH DEGREE OF RELEVANCE

Figure 4.7 Braid Archetype | By Author



# VALLEY



**Brief Description:** The valley archetype immerses users within a submerged landscape surrounded by heavy topographic relief and draws views towards the sky to direct users attention away from worldly stresses.

**Spatial Character:** The space provides an powerful relationship with the surrounding landforms and creates an intimate embrace to allow an increased sense of privacy and mystery.







**Functions/Activities:** Strolling, sitting, reclining, cloud watching, skating, yoga, and exercising

**Appropriate Context:** This type is most appropriate to define entrances or transitions within a garden setting

**Spatial Enclosure:** Medium

**Sensory Stimulation:** Medium

## Archetype Connection To Key Themes:

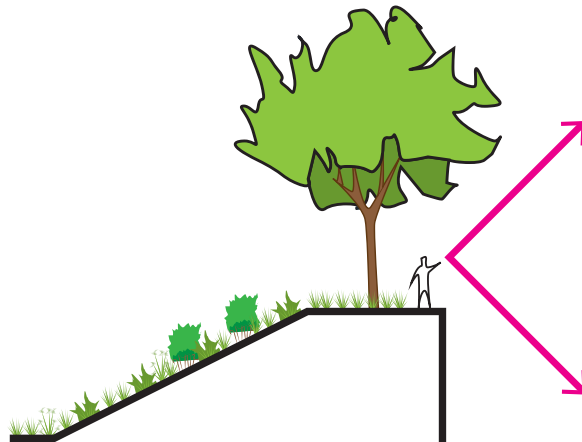
NATURE + STIMULATION	MOVEMENT + CONTROL	RICHNESS + VARIETY
NATURAL DISTRACTIONS PREVALENCE OF GREEN MATERIAL 	MOVEMENT/EXERCISE EXTENT ACCESSIBILITY 	COMPLEXITY MYSTERY FASCINATION 
INTROSPECTIVE + PERSONAL	SOCIAL + COMMUNAL	FAMILIARITY + SUITABILITY
QUIET MINIMIZE INTRUSIONS BEING AWAY REFUGE 	PROSPECT 	COHERENCE LEGIBILITY COMFORT MINIMIZE AMBIGUITY 

 = LOW DEGREE OF RELEVANCE

 = HIGH DEGREE OF RELEVANCE

Figure 4.8 Valley Archetype | By Author

# BLUFF



**Brief Description:** The bluff archetype is based on the inherent human desire for prospect and domination over our surroundings and is intended to simulate the fascination and exhilaration felt standing at a cliff edge and taking in the surrounding landscape.

**Spatial Character:** The space is clearly situated above other nearby surroundings and provides seemingly endless undisturbed views that gives one a powerful sense of spatial extent.







**Functions/Activities:** People watching, sitting, strolling, socializing, star gazing, and photography

**Appropriate Context:** This type is most appropriate overlooking social and landscaped spaces of great extent

**Spatial Enclosure:** Low

**Sensory Stimulation:** High

## Archetype Connection To Key Themes:

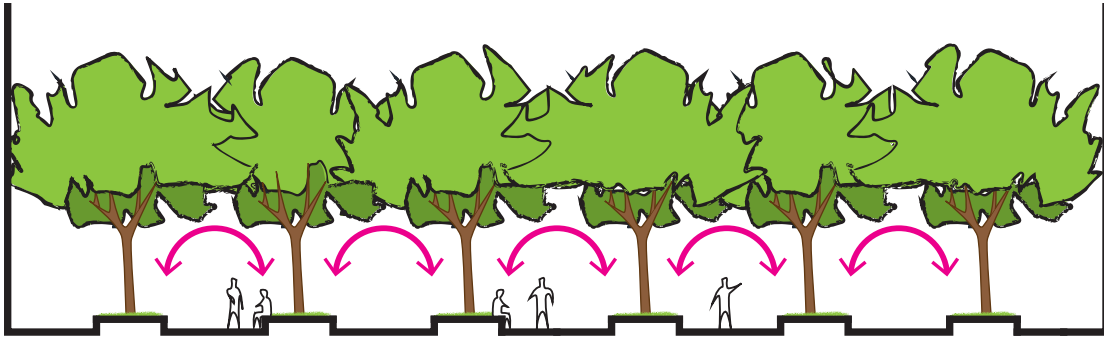
NATURE + STIMULATION	MOVEMENT + CONTROL	RICHNESS + VARIETY
NATURAL DISTRACTIONS 	EXTENT SENSE OF CONTROL/ ACCESS TO PRIVACY 	FASCINATION 
INTROSPECTIVE + PERSONAL	SOCIAL + COMMUNAL	FAMILIARITY + SUITABILITY
BEING AWAY 	PROSPECT VISIBILITY SOCIAL SUPPORT 	COHERENCE LEGIBILITY COMPATIBILITY MINIMIZE AMBIGUITY 

 = LOW DEGREE OF RELEVANCE

 = HIGH DEGREE OF RELEVANCE

Figure 4.9 Bluff Archetype | By Author

# GROVE



**Brief Description:** The grove archetype describes an intimate “outdoor room” strongly defined by a ceiling of vegetation created through dense arrangement of trees planted in a formal grid. This outdoor room creates a series of subspaces between tree trunks.

**Spatial Character:** The space is defined by its calm atmosphere and ability to block out the noises and distractions of the outside world while creating a series of small introspective spaces.







**Functions/Activities:** Strolling, sitting, meditation, sketching, sculpture viewing, napping, and eating

**Appropriate Context:** This type is most appropriate within a space with a high degree of architectural enclosure

**Spatial Enclosure:** High

**Sensory Stimulation:** High

## Archetype Connection To Key Themes:

NATURE + STIMULATION	MOVEMENT + CONTROL	RICHNESS + VARIETY
NATURAL DISTRACTIONS PREVALENCE OF GREEN MATERIAL PROVIDE POSITIVE DISTRACTIONS 	EXTENT ACCESSIBILITY SENSE OF CONTROL/ ACCESS TO PRIVACY 	COMPLEXITY MYSTERY FASCINATION VARIETY OF SUBSPACES 
INTROSPECTIVE + PERSONAL	SOCIAL + COMMUNAL	FAMILIARITY + SUITABILITY
QUIET MINIMIZE INTRUSIONS BEING AWAY REFUGE 	SOCIAL SUPPORT 	COHERENCE & LEGIBILITY COMFORT FAMILIARITY UNAMBIGUOUSLY POSITIVE ART 

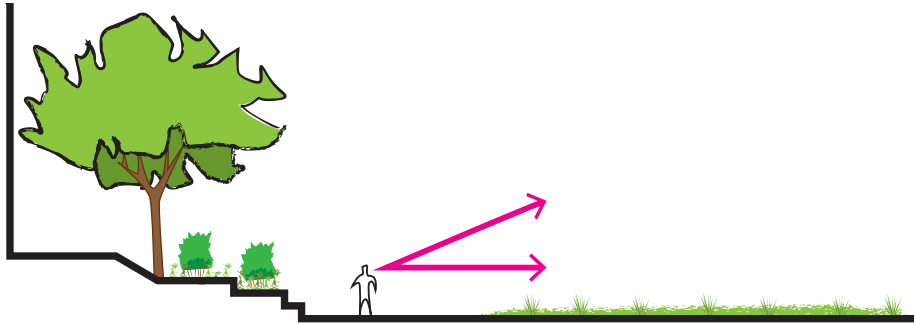
● = LOW DEGREE OF RELEVANCE

● = HIGH DEGREE OF RELEVANCE

Figure 4.10 Grove Archetype | By Author



# FRINGE



**Brief Description:** The fringe archetype is based on the inherent human desire to have protection from the rear while also enjoying a view across an open space. The user is grounded by dense planting and land form to provide a comfortable setting to experience a scene from.

**Spatial Character:** The type is strongly weighted towards one side as a space to inhabit and ground oneself within while the adjacent spaces serve circulation and viewing functions.







**Functions/Activities:** People watching, sitting, strolling, relaxation, socializing, and dining

**Appropriate Context:** This type is most appropriate overlooking social and landscaped spaces of great extent

**Spatial Enclosure:** Medium

**Sensory Stimulation:** Medium

## Archetype Connection To Key Themes:

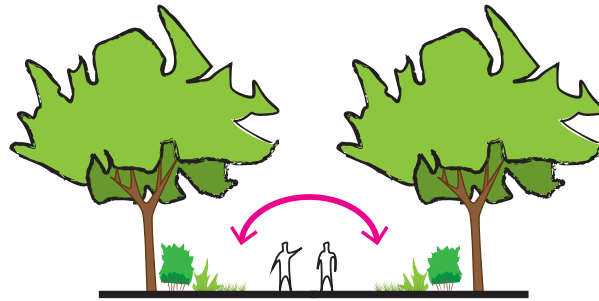
NATURE + STIMULATION	MOVEMENT + CONTROL	RICHNESS + VARIETY
NATURAL DISTRACTIONS PREVALENCE OF GREEN MATERIAL 	EXTENT SENSE OF CONTROL/ ACCESS TO PRIVACY ACCESSIBILITY 	FASCINATION VARIETY OF SUBSPACES DESIGN METAPHORS 
INTROSPECTIVE + PERSONAL	SOCIAL + COMMUNAL	FAMILIARITY + SUITABILITY
BEING AWAY REFUGE 	PROSPECT VISIBILITY SOCIAL SUPPORT 	COHERENCE & LEGIBILITY COMPATIBILITY MINIMIZE AMBIGUITY UNAMBIGUOUSLY POSITIVE ART 

 = LOW DEGREE OF RELEVANCE

 = HIGH DEGREE OF RELEVANCE

Figure 4.11 Fringe Archetype | By Author

# CHANNEL



**Brief Description:** The channel archetype describes a space of movement and energy and is crafted through careful layering of plant material to define a linear vegetated passageway. The layering of plant material envelops the user within a sensory packed circulation corridor.

**Spatial Character:** The space is characterized by its dense sensory appealing planting and tightly focused viewing corridor which defines the movement of users through the visceral circulation space.







**Functions/Activities:** Strolling, wandering, meeting, people watching

**Appropriate Context:** This type is appropriate to connect larger spaces within a constrained spatial boundary

**Spatial Enclosure:** High

**Sensory Stimulation:** High

## Archetype Connection To Key Themes:

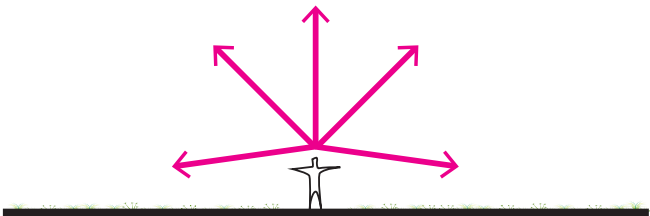
NATURE + STIMULATION	MOVEMENT + CONTROL	RICHNESS + VARIETY
NATURAL DISTRACTIONS PREVALENCE OF GREEN MATERIAL PROVIDE POSITIVE DISTRACTIONS 	EXTENT ACCESSIBILITY SENSE OF CONTROL/ ACCESS TO PRIVACY 	COMPLEXITY MYSTERY FASCINATION VARIETY OF SUBSPACES 
INTROSPECTIVE + PERSONAL	SOCIAL + COMMUNAL	FAMILIARITY + SUITABILITY
QUIET MINIMIZE INTRUSIONS BEING AWAY REFUGE 	SOCIAL SUPPORT 	COHERENCE LEGIBILITY COMFORT 

 = LOW DEGREE OF RELEVANCE

 = HIGH DEGREE OF RELEVANCE

Figure 4.12 Channel Archetype | By Author

# FIELD



**Brief Description:** The field archetype is similar in spatial structure to the previously described braid, however the field is populated with a more accessible open lawn that gives the space a great deal of flexibility while maintaining expansive views to the horizon and sky.

**Spatial Character:** An expansive open lawn allows this type to provide flexibility to permit a wide range of programmed and unprogrammed activities to take place.







**Functions/Activities:** Picnicking, frisbee throwing, festivals, concerts, outdoor classrooms, and sports

**Appropriate Context:** This type is most appropriate overlooking social and landscaped spaces of great extent

**Spatial Enclosure:** Very Low

**Sensory Stimulation:** Medium

## Archetype Connection To Key Themes:

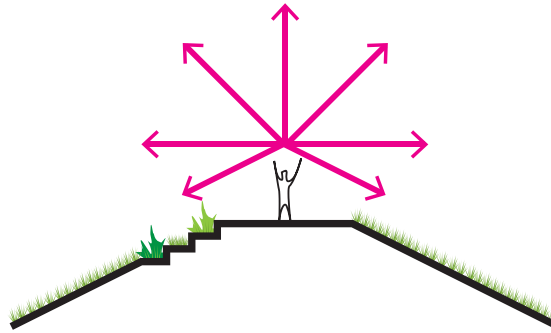
NATURE + STIMULATION	MOVEMENT + CONTROL	RICHNESS + VARIETY
NATURAL DISTRACTIONS PREVALENCE OF GREEN MATERIAL 	EXTENT ENCOURAGE EXERCISE ACCESSIBILITY SENSE OF CONTROL 	FASCINATION DESIGN METAPHORS 
INTROSPECTIVE + PERSONAL	SOCIAL + COMMUNAL	FAMILIARITY + SUITABILITY
	PROSPECT VISIBILITY SOCIAL SUPPORT 	COHERENCE LEGIBILITY COMPATIBILITY MINIMIZE AMBIGUITY 

 = LOW DEGREE OF RELEVANCE
  = HIGH DEGREE OF RELEVANCE

Figure 4.13 Field Archetype | By Author



# PEAK



**Brief Description:** The peak archetype elevates the user above their surroundings and surrounds them with sensory stimulating plant material. It creates a sense of spatial hierarchy through elevation change and give users a sense of power and domination of the context.

**Spatial Character:** The space is marked by its ability to connect a user with a greater amount of the surrounding context through topographic relief and allows individuals too feel as if they are walking on top of the world.







**Functions/Activities:** Strolling, wandering, meeting, star gazing, people watching, and reflection

**Appropriate Context:** This type is appropriate to provide glimpses of expansive views after introspective spaces

**Spatial Enclosure:** Very Low

**Sensory Stimulation:** High

## Archetype Connection To Key Themes:

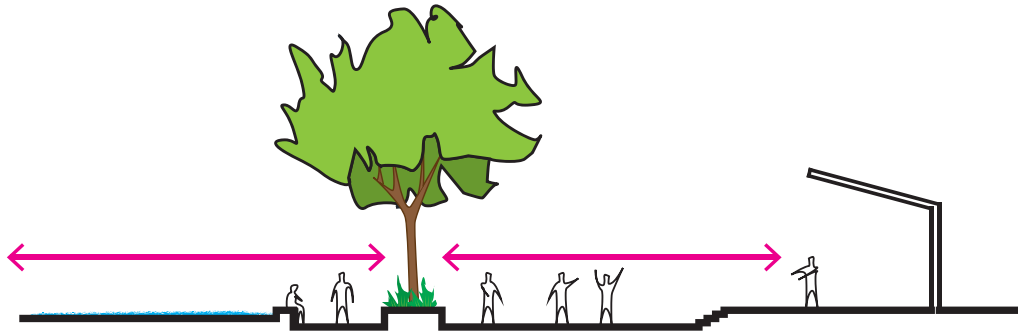
NATURE + STIMULATION	MOVEMENT + CONTROL	RICHNESS + VARIETY
NATURAL DISTRACTIONS PREVALENCE OF GREEN MATERIAL PROVIDE POSITIVE DISTRACTIONS 	EXTENT SENSE OF CONTROL/ ACCESS TO PRIVACY 	FASCINATION 
INTROSPECTIVE + PERSONAL	SOCIAL + COMMUNAL	FAMILIARITY + SUITABILITY
BEING AWAY 	PROSPECT VISIBILITY SOCIAL SUPPORT 	COHERENCE LEGIBILITY MINIMIZE AMBIGUITY 

 = LOW DEGREE OF RELEVANCE

 = HIGH DEGREE OF RELEVANCE

Figure 4.14 Peak Archetype | By Author

# STAGE



**Brief Description:** The stage archetype provides a open setting for structured and unstructured social events and activities to take place. Landscaped interventions are limited to the periphery of the space to allow gathering and social interaction to occur.

**Spatial Character:** As the most hardscaped archetype defined, the stage acts as a public plaza to provide a home for a wide range of events and remains less spatially defined to allow space for these planned occasions.







**Functions/Activities:** Concerts, plays, debates, rallies, public forums, outdoor classrooms, dining, and gathering

**Appropriate Context:** This type is most appropriate at the junction of major pedestrian circulation routes

**Spatial Enclosure:** Very Low

**Sensory Stimulation:** Low

## Archetype Connection To Key Themes:

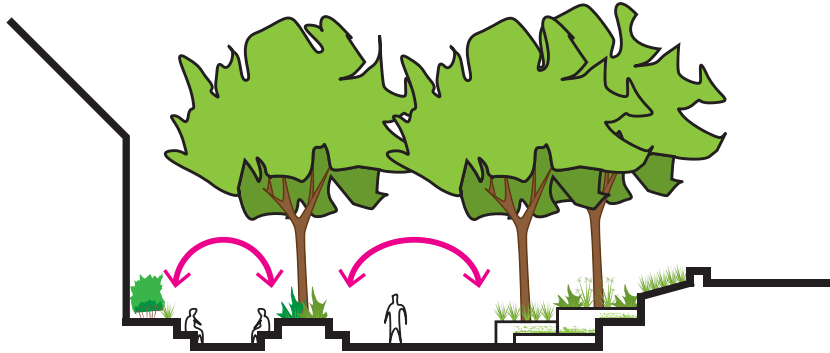
NATURE + STIMULATION	MOVEMENT + CONTROL	RICHNESS + VARIETY
NATURAL DISTRACTIONS 	EXTENT ENCOURAGE EXERCISE ACCESSIBILITY SENSE OF CONTROL 	FASCINATION DESIGN METAPHORS VARIETY OF SUBSPACES 
INTROSPECTIVE + PERSONAL	SOCIAL + COMMUNAL	FAMILIARITY + SUITABILITY
	PROSPECT VISIBILITY SOCIAL SUPPORT 	COHERENCE LEGIBILITY COMPATIBILITY 

 = LOW DEGREE OF RELEVANCE

 = HIGH DEGREE OF RELEVANCE

Figure 4.15 Stage Archetype | By Author

# LOWLAND



**Brief Description:** The lowland archetype allows users to descend below the realm of surrounding activities to escape the outside world within a realm of highly sensory appealing sunken gardens. Tiered planters and seating areas structure dynamic subspaces in this type.

**Spatial Character:** Enclosure and spatial richness define the experience of the lowland as users are enveloped within a setting of dense plantings and removed from the stresses and hectic nature of the outside world.







**Functions/Activities:** Reading, studying, meetings, napping, meditation, exploration, and reclining

**Appropriate Context:** This type is best suited near a university library to provide a focused, productive space

**Spatial Enclosure:** High

**Sensory Stimulation:** High

## Archetype Connection To Key Themes:

NATURE + STIMULATION	MOVEMENT + CONTROL	RICHNESS + VARIETY
NATURAL DISTRACTIONS PREVALENCE OF GREEN MATERIAL PROVIDE POSITIVE DISTRACTIONS 	EXTENT SENSE OF CONTROL/ ACCESS TO PRIVACY ACCESSIBILITY 	FASCINATION MYSTERY COMPLEXITY VARIETY OF SUBSPACES 
INTROSPECTIVE + PERSONAL	SOCIAL + COMMUNAL	FAMILIARITY + SUITABILITY
QUIET MINIMIZE INTRUSIONS BEING AWAY REFUGE 	SOCIAL SUPPORT 	COHERENCE LEGIBILITY COMPATIBILITY MINIMIZE AMBIGUITY 

 = LOW DEGREE OF RELEVANCE

 = HIGH DEGREE OF RELEVANCE

Figure 4.16 Lowland Archetype | By Author



05

## INVESTIGATION

The Kansas State University campus is selected as a case to explore how the active transportation and restorative landscape design frameworks defined in the previous chapter can be applied to increase student's mental and physical health. The chapter is structured to provide relevant inventory, analysis, and site selection rationale within the campus to inform design decisions made subsequently. To define site opportunities and constraints, this analysis is both spatial and qualitative in nature.

# SITE INTRODUCTION

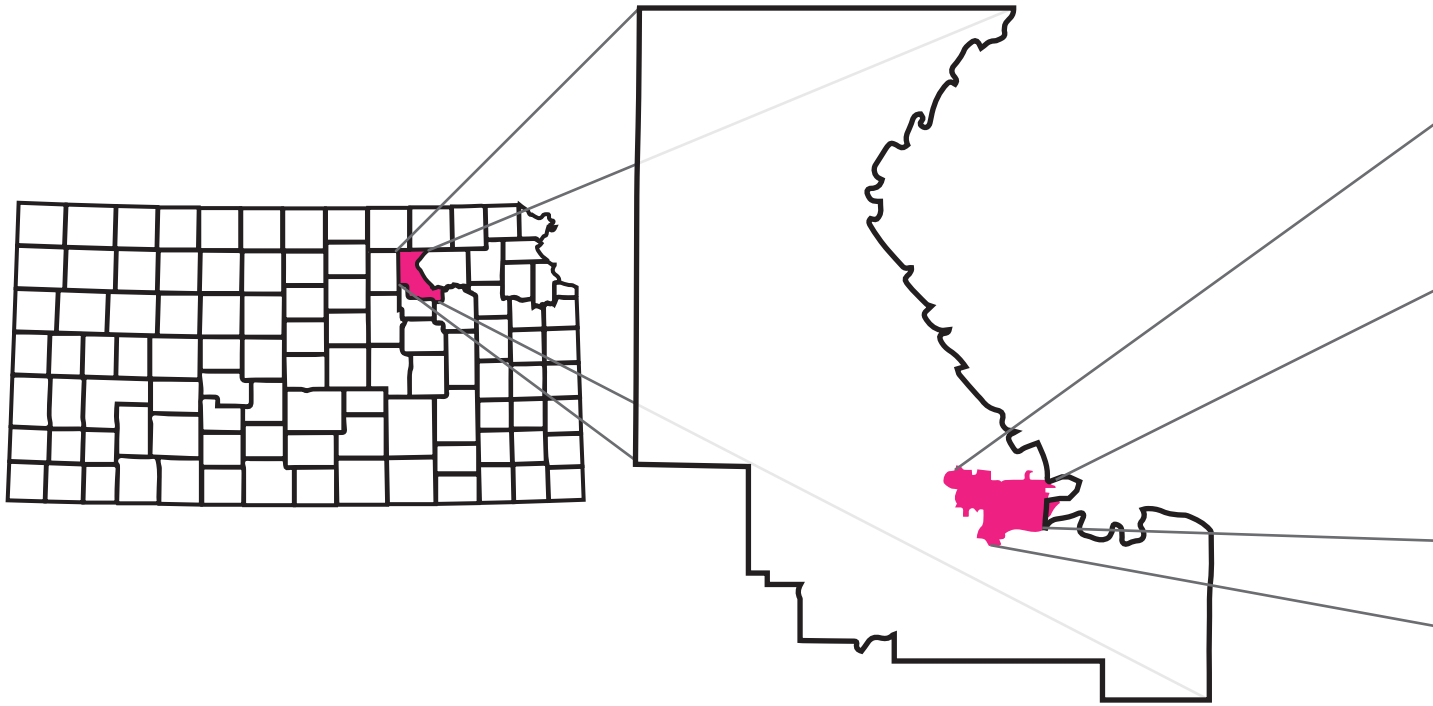


Figure 5.1 Site Location | By Author

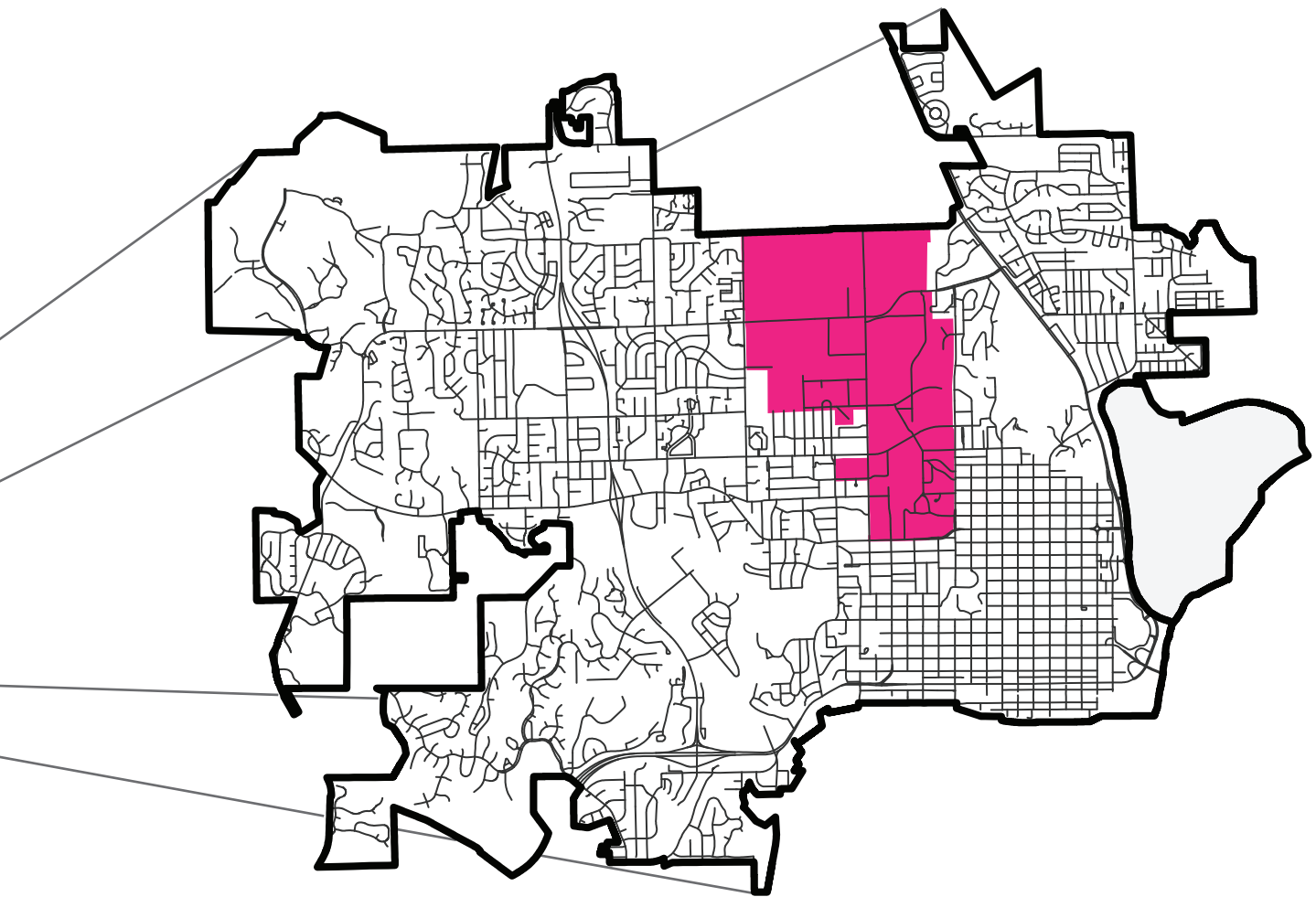
## KANSAS STATE UNIVERSITY LOCATION

Kansas State University occupies a 668 acre main campus within the city of Manhattan, Kansas. Manhattan lies within Riley County and is the most populous city in the county. Riley County lies within the Flint Hills physiographic region of the state of Kansas and is characterized by its unique rolling hills and tallgrass prairie. The Kansas State University campus, illustrated on the facing page in Figure 5.1 occupies a significant amount of the overall city fabric. The university is bound by Anderson Avenue to the south, Manhattan Avenue to the east, Denison and College Avenues to the west, and by Kimball

Avenue to the North. The campus acts as a key civic and cultural institution and is the largest employer in the city (ASG, 2012).

## BRIEF CAMPUS HISTORY

Kansas State University's main campus in Manhattan, Kansas has been selected as the project site for further analysis, exploration, and design base on its representative nature as a typical university campus and proximity to the author. The university, which first opened its doors to students on September 2, 1863 under the name The Kansas State Agricultural College, lies within the center of the urban fabric



of Manhattan, Kansas (Weisenburger, 1973). The university currently has an enrollment of over 24,000 students from all fifty states and more than 100 countries (KSU, 2015). Furthermore, Kansas State University can be examined as a case of a typical university campus as its development closely follows national trends of public universities. Kansas State University was the first land grant state college created under the Morrill Act in 1863, and was formed with a focus in providing education which promotes “the

deliveral and practical education of the industrial class in the several pursuits and professions in life” (Weisenburger, 1973, p. 3). In 1871 the campus was moved to the present location from the original site approximately one mile west of the current campus because the previous site was not well suited for agricultural experiments. The university’s second president, John Anderson did not believe in constructing large buildings but rather felt that the campus should be perceived as “a little hamlet of thrifty artisans built into the



# SITE INTRODUCTION

heart of rich, well tilled fields” (Weisenburger, 1973, p. 7). This deeply rooted respect for the natural environment of the campus from the university’s birth will inform the planning and development of the institution for over a century. The development of the campus between the years of 1871 and 1894 revolved around development of agricultural plots on the 220 acre main campus site (Weisenburger, 1973). A cluster of buildings including Anderson Hall, Mechanics Hall, Fairchild Hall, and Calvin hall we completed along the southeast hilltop of campus between 1875 and 1908, creating the front door for the university. For much of this time period, there was little documented thought related to the campus development in the future and no intention to shaping outdoor spaces with building masses. However, the completion of Waters Hall in 1913 and subsequent construction of Farrell Library marked the first obvious planning intention related to the shaping of functional outdoor space.

In 1952, President McCain commissioned the landscape architectural firm Hare and Hare out of Kansas City, MO to prepare the first formalized plan for the development of campus (Weisenburger, 1973). This document was not accompanied with any report or analysis, but was rather just a simple guiding plan for growth. It wasn’t until 1967 that the first steps towards establishing a campus planning office were taken (Weisenburger, 1973). The first report of the planning department is the KSU Campus Planning Study of 1968, which represents the first comprehensive inquiry and analysis into the existing conditions on campus and potential

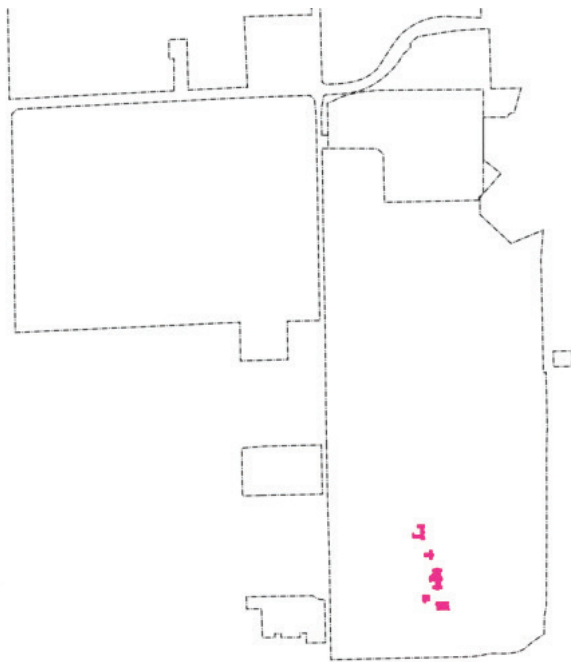
solutions to mitigate problems and carefully guide growth. Of the eight problems identified related to the campus environment in 1968, three are extremely relevant to the exploration of this project. These include “campus spaces and landscape, pedestrian movement, and vehicular traffic” (KSU, 1968). The report remarks that there is “no unifying element that ties the campus through the use of open spaces” and that the campus is lacking “outdoor spaces which could be conducive to socializing and resting” (KSU, 1968, p. 8-9). The report also comments that the spaces that are left on campus “seem to be cut up by an endless maze of concrete [sidewalks] with no thought given to courts, plaza, and small intimate areas for conversation” (KSU, 1968, p. 100).

Even 47 years ago, when creating this planning document the authors cite the separation of the pedestrian from vehicle as one of the major problems facing the campus and go as far as recommending that all non-university owned vehicles be prohibited from campus streets (KSU, 1968). Claflin Road was identified in this study as a major area of pedestrian and vehicle conflict, leading to the recommendation that Claflin Road be closed, much like the 2012 Kansas State University Master Plan recommends (KSU, 1968; ASG, 2012) Lastly, the authors recommend that “pedestrian arteries should be allowed to meander and provide a more exciting and relaxing atmosphere” and that “pedestrian arteries coming into campus should be provided with a bicycle path” (KSU, 1968, p. 110). Subsequent circulation plans created in 1973 and 1990 echo these

findings and continually prompt the university to explore methods related to increasing the quality of pedestrian infrastructure, reducing vehicular access to the campus, and establishing a defined spine of open space to unite the campus spatially and aesthetically (Oblinger-Smith Corporation, 1973; Barton-Aschman Associates, Inc, 1990). Both the 1973 and 1990 circulation plans identify Mid Campus Drive as a suitable street to schedule for removal and redevelopment into a “pedestrian space serving tiers of buildings on either side and providing for north south [pedestrian] flows” (Oblinger-Smith Corporation, 1973; p. 3.7; Barton-Aschman Associates, Inc, 1990). Furthermore, it was recommended that the open space corridor beginning on the south edge of the campus and extending north to reach Campus Creek be developed as an open space corridor for recreational use by pedestrians, joggers, and bicyclists. After implementation, they remark, the south side of the campus would be just minutes from the expanding north campus and recreation areas (Oblinger-Smith Corporation, 1973).

While these planning decisions are oftentimes put forward as best case scenarios without specific concern for cost of implementation, the concepts discussed in these three guiding documents seek to make Kansas State University a more spatially cohesive, relaxing, and generally pleasant environment. Overall, many of the issues and solutions identified nearly half a century ago related to campus landscape unity, pedestrian movement, and vehicular traffic still exist are more relevant now than ever to tackle as Kansas State University looks to the future.

# HISTORICAL CAMPUS GROWTH



■ New Buildings During Period  
■ Existing Buildings

Figure 5.2 Campus Development From 1863-1899 |  
Adapted From: (ASG, 2012)

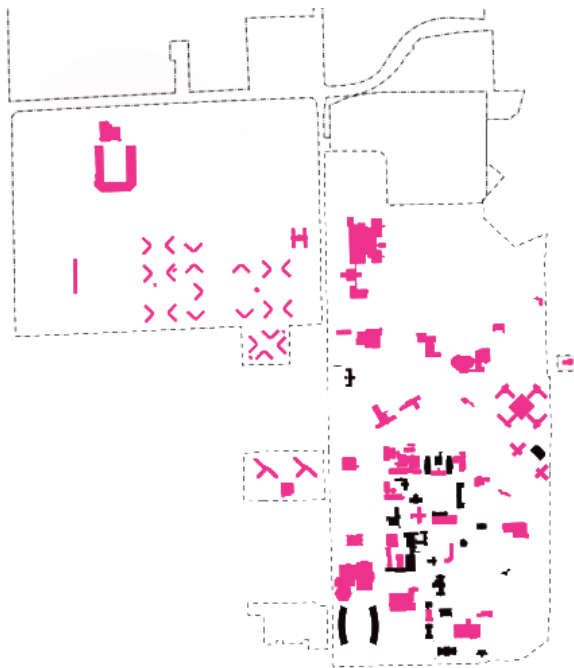
**1863-1899**



■ New Buildings During Period  
■ Existing Buildings

Figure 5.3 Campus Development From 1900-1939 |  
Adapted From: (ASG, 2012)

**1900-1939**



■ New Buildings During Period  
 ■ Existing Buildings

Figure 5.4 Campus Development From 1940-1979 |  
Adapted From: (ASG, 2012)

**1940-1979**



■ New Buildings During Period  
 ■ Existing Buildings

Figure 5.5 Campus Development From 1980-2015 |  
Adapted From: (ASG, 2012)

**1980-2015**



# RECENT CAMPUS PLANNING

## BACKGROUND

In February of 2010, Kansas State University launched a visionary planning initiative with the goal of becoming recognized as a “Top 50 Public Research University by 2025” (KSU, 2010). Over the course of the next 15 years, the university sought to redefine what it meant to be a modern land-grant university. The initiative identified and outlined key thematic goals in order to measure progress towards the overall goal. The thematic goal most relevant to this project is entitled Facilities and Infrastructure, which calls for:

*“[Providing] facilities and infrastructure that meet our evolving needs at a competitive level with our benchmark institutions and are an asset to recruit and retain quality students, faculty, researchers, and staff”*  
- (KSU, 2010)

The university has clearly recognized that its intentions to gain prestige as a research institution are directly tied to the physical opportunities and constraints of its own campus environment. Identifying and understanding the current affordances and future needs of the physical campus environment is therefore of utmost importance to achieve these visionary goals. Kansas State University expects that within 11-15 years, they will have realized an “excellent campus community experience supported by facilities and landscapes that enhance social interaction, learning and collaboration” (KSU, 2010). The plan details

several actions or objectives which should be undertaken to achieve the overarching visionary goal. One specific action called out within the facilities theme identifies the need to:

*“Create and regularly update a new, dynamic Campus Master Plan aligned with the 2025 Vision that incorporates landscapes and addresses parking and other circulation issues.”*  
- (KSU, 2010)

In fulfillment of this plan, two years later, the design firm Ayers Saint Gross completed the most recent update to the Kansas State University Master Plan. The plan acts as a living, breathing document to guide growth and establish a framework that will allow Kansas State University to prioritize the direction of its growth, spending, and development looking towards 2025 (ASG, 2012). The framework of the campus master plan is grounded in the guidance of the 2025 vision plan established by Kansas State University itself. Analysis of the campus master plan documents was undertaken to identify driving forces and goals behind design and planning decisions. Two relevant themes within the master plan, campus identity and campus connectivity, were identified by the author for further description.

## PROCESS

The campus master plan was undertaken with a high level of commitment in engaging faculty, staff, students, alumni, trustees, and neighbors in order to best understand the needs and

insights of each party along with the subsequent relationships between these findings. Meetings with community stakeholders, websites to collect observations and ideas from students, and regular contact between Ayers Saint Gross and a university chosen “task force” solidified these intentions of creating a final product that represents the needs of all parties (ASG, 2012). A constant feedback loop between stakeholders and designers allowed analysis, idea generation, and planning to be accomplished effectively.

## **IDENTITY**

Ayers Saint Gross acknowledges the importance of developing a unique identity within the campus, and remark that in order to strengthen the identity of the campus planning and design of outdoor spaces should “honor the unique landscape of the prairie” (ASG, 2012, p. 71). The campus is currently designed akin to the open green lawns and quadrangles of many east coast institutions, and outside of a few small spaces does not evoke a strong connection to the surrounding Flint Hills context. The master plan recognizes the aesthetic value of the picturesque spaces which make up the open space network on campus, and explains that building infill must be considered carefully in order to preserve this network of natural spaces.

ASG recommends that this open space network be “enhanced and expanded” to improve the campus connectivity discussed previously, as well as providing new “opportunities for gathering, contemplation, and recreation” (ASG,

2012, p. 99). The limited architectural material palette of rough cut limestone paired with the spatial orientation of the building masses in forming an interconnected series of informal quadrangles and lawns are primary contributors to the current campus identity (ASG, 2012). This palette should be maintained looking to the future to promote architectural clarity on campus. Overall, the campus identity of Kansas State University is well established and should be preserved and refined when considering any changes to the built environment.

## **CONNECTIVITY**

Goals and principles related to connectivity outline analysis and planning decisions relevant to creating a more connected open space network within the campus core with the intention of bringing more coherence to the navigation of campus as a pedestrian or bicyclist (ASG, 2012). The plan imagines a shift away from the current automobile centric streets within the campus by redesigning and retrofitting campus streets to be catered towards the needs of a growing body of students interested in participating in active transportation. Claflin Road, 17th Street, and Mid Campus Drive were all identified within the campus master plan as suitable streets for conversion to limited access drives and pedestrian malls. One of the key areas of concern identified by Ayers Saint Gross related to circulation is Mid-Campus Drive, particularly near Hale Library (2012). The removal of daily vehicular access within these three streets would triple the size of the

pedestrian only core within Kansas State's campus as seen in Figures 5.6 and 5.7 a on the facing page. The closure and conversion of 17th Street has been explored previously with the 17th Street Corridor Study conducted by PLAID Collaborative (ASG, 2012).

The circulation routes existing within the campus today need to be clarified in order to improve safety for all modes of travel (ASG, 2012). The street closures discussed above paired with shifting parking from the core of the campus to the periphery will help mitigate some of these safety issues. Exploration into actual methods to promote modal shift to alternatives to driving is brief, but important to note (ASG, 2012). An additional facet to the exploration of connectivity involves the proposal of an improved campus transit system to serve internal campus movement while also providing alternatives for students, staff, and faculty to commute to campus. Ayers Saint Gross also identifies that as the campus naturally grows and expands to the North, the 1,800 existing parking spots at Bill Snyder Family Stadium can be served by a park and ride bus system. Commuters would leave their vehicles at the stadium while on campus and take advantage of regularly running shuttle services to reach various locations within the core campus. These shuttles would significantly reduce conflicts between personal vehicles and other active travel modes (ASG, 2012).

Lastly, the plan recognizes the importance of planning separated bicycle routes, adding bicycle

related support infrastructure, and avoiding bicycle-pedestrian conflicts. The master plan makes this separation of pedestrian and bicyclist modes a prime concern (ASG, 2012). Conflicts between travel modes, especially within the campus core are common and increasingly important to mitigate as the student body and building density on campus increases looking to the future. The prioritization of active transportation seen within the campus master plan directly aligns with the goals and objectives of this project, and further grounds the relevance of this project's inquiry and exploration.

## **PROJECT ASSUMPTIONS + STANCE**

For the purposes of this master's project and report, the building infill proposed by Ayers Saint Gross within this masterplan will be respected and responded to with all site level design decisions. As this project examines changes to the built environment at both a campus wide systems level and site scale in the long term, the planning and design proposals generated by this project will be most relevant to future growth scenarios. The author agrees with all of the goals and principles set forth by Ayers Saint Gross within the Campus Master Plan; however, it has been determined that there is an opportunity to push design solutions related to campus street closure and conversion to an elevated level that can directly impact the mental and physical health and well-being of the student body at Kansas State University. A design proposal in the following chapter outlines and explains this process and product.

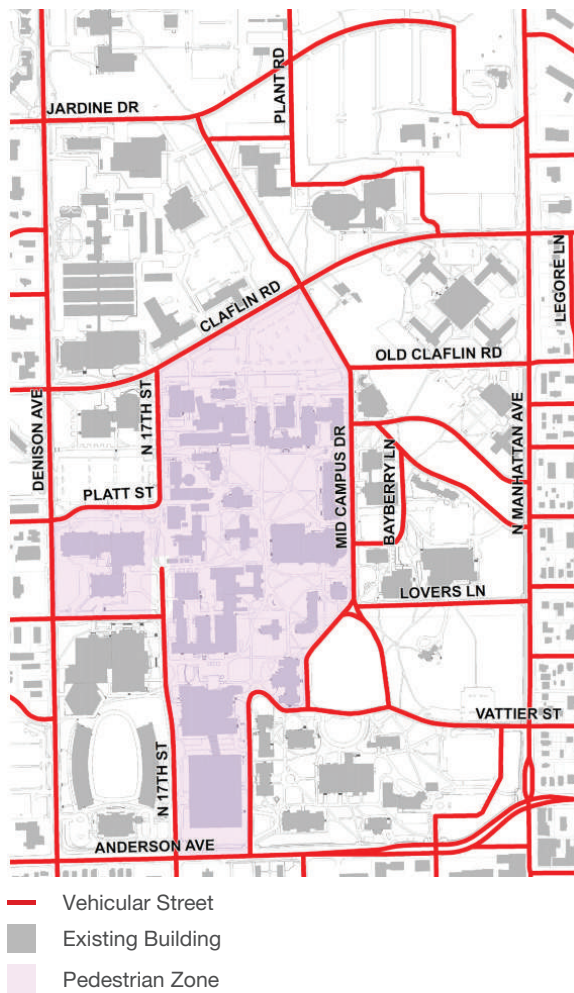


Figure 5.6 Current Pedestrian Only Zone Within The Kansas State University Campus | (ASG, 2012)

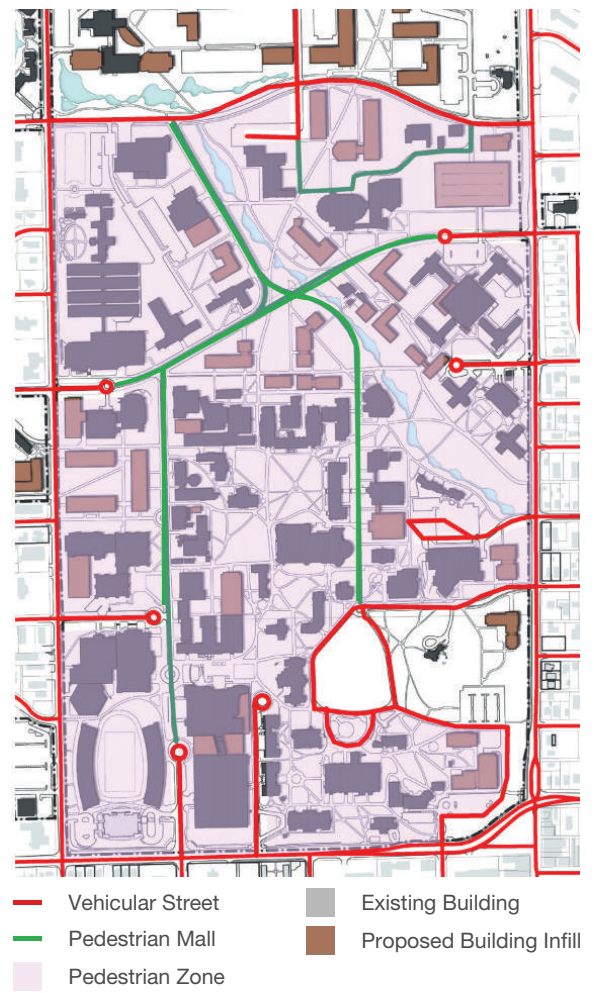


Figure 5.7 Pedestrian Only Zone Within Kansas State University's Campus After Street Closure | (ASG, 2012)



# CAMPUS SCALE ANALYSIS: ENTIRE CAMPUS

Analysis of Kansas State University is conducted at three scales to first identify current affordances of active transportation and mental restoration, and second to select an appropriate street corridor for closure to vehicular traffic and conversion to a pedestrian walking thoroughfare. Initial campus scale analysis examines how the campus fits within the city fabric of Manhattan, Kansas and explores current levels of connectivity between pedestrian and bicycle infrastructure within the campus and its context. Gaps in the service provided by the current affordances were identified and used to inform the planning and design of improved bicycle and pedestrian services within Chapter 6 of this document. Figure 5.8 to the right identifies the Kansas State University campus boundary while also illustrating areas of particular interest within the campus and its immediate context. The recreation complex is quite far from the campus core. Campus growth identified within the 2012 master plan will primarily occur on the North side of the core campus. Additionally, the National Bio and Agro-Defense Facility (NBAF) will be constructed by 2018 on the North end of the campus, bringing over 500 jobs to Manhattan. Very few affordances for bicycling to these key destinations currently exist, providing unique opportunities for infrastructural overhauls within the scope of this project. Lastly, the primary cultural/commercial student life center, Aggieville, is located directly adjacent to the Southeast corner of the university campus. This district must be better integrated into the campus fabric to promote active transportation.

## KEY CAMPUS & CONTEXT RELATIONSHIPS

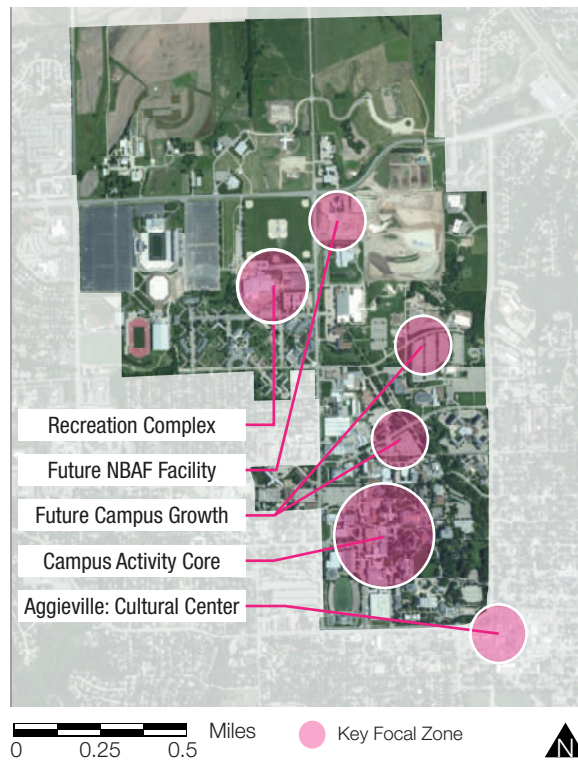


Figure 5.8 Kansas State University Campus Relationships  
| By Author

Aerial imagery above illustrate the overall campus boundary and contents of the Kansas State University campus. The southern third of the campus contains a majority of the academic and student life functions while the northern two thirds of the campus consists primarily of athletics facilities, student housing, and research facilities. As seen in the aerial imagery the density of the southern third of the campus is much higher than the rest of the campus and limited greenspace exists within this core.

## VEHICULAR INFRASTRUCTURE

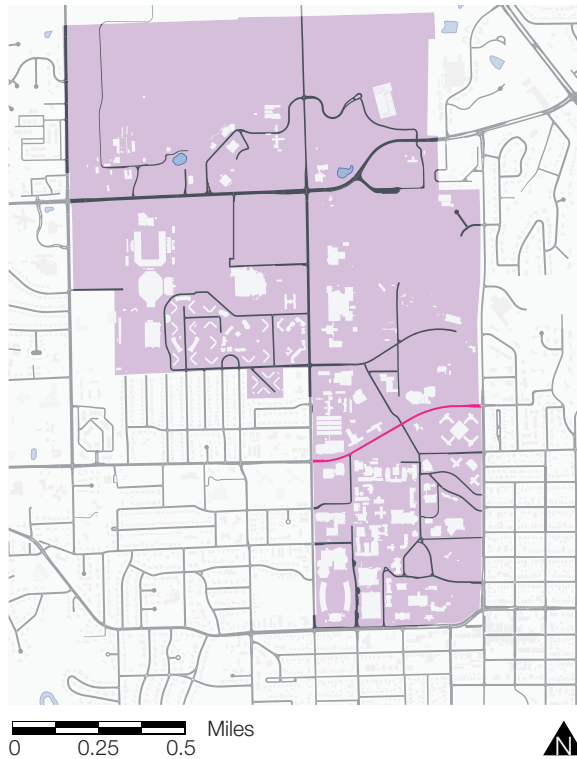


Figure 5.9 Kansas State University Vehicular Infrastructure  
| By Author

The campus is embedded within the city fabric of Manhattan Kansas and therefore connects to the surrounding vehicular street grid at several points along the campus perimeter. Vehicular routes are primarily in place to provide service and emergency access to buildings and provide access to several large campus parking lots. While most vehicular travel throughout the city occurs outside of the campus, Clafin Drive (highlighted in Magenta) is often used to cut through the campus, causing significant traffic.

## SURROUNDING LAND USES

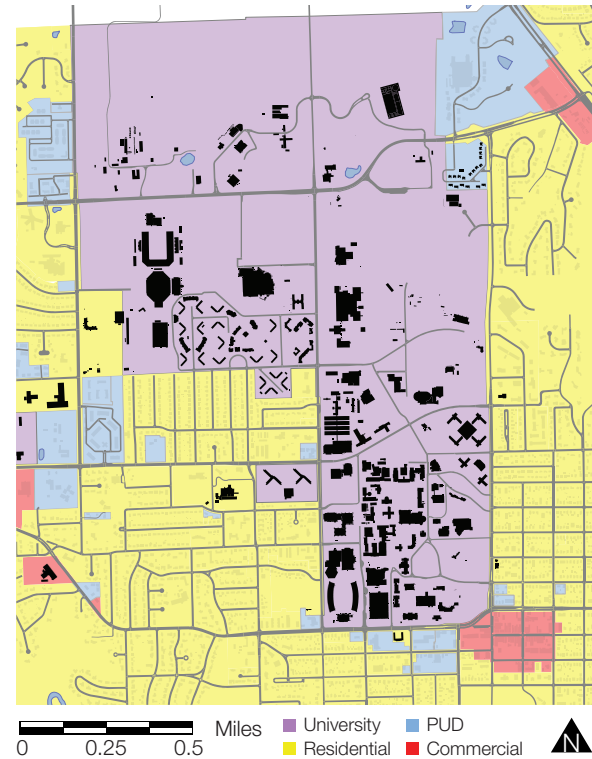


Figure 5.10 Campus And Immediate Context Zoning  
| By Author

The Kansas State University campus is surrounded predominantly by residential zoning which provides much of the student housing. The southeast corner of campus is bordered by a dense commercial district known as “Aggieville” that provides restaurants, nightlife, and other shopping opportunities to the student body as well as the rest of the community. Several pockets of planned unit developments define various high density apartment complexes and commercial districts around the campus boundary.

## CAMPUS ELEVATION CHANGE

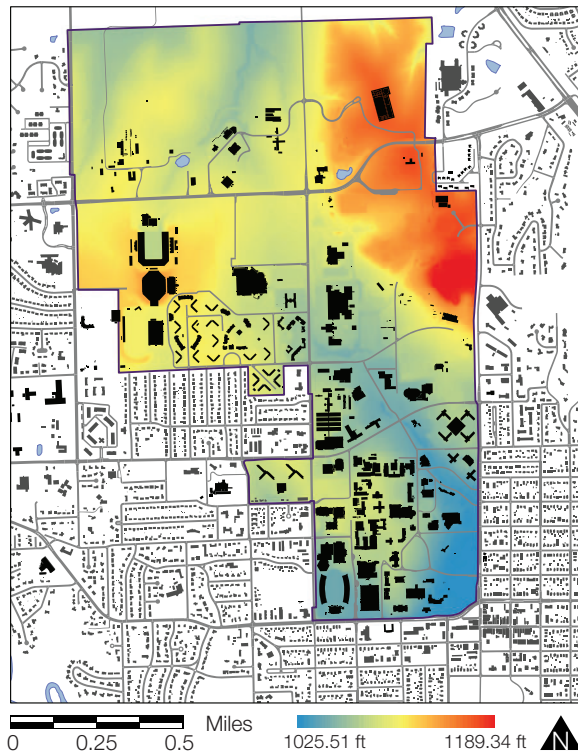


Figure 5.11 Elevation Map of Kansas State University |  
By Author

Much of the campus developed on a plateau overlooking the current bounds of Aggieville, and therefore fairly significant elevation change can be seen along the southeastern edge of the campus. The course of Campus Creek, the main conveyor of stormwater within the campus, can be identified as the blue swath stretching from the southeast corner to the northwest. The degree of topographic relief on campus has not been identified as a hinderance to active transportation behaviors in the student body.

## CAMPUS SLOPE PERCENTAGE

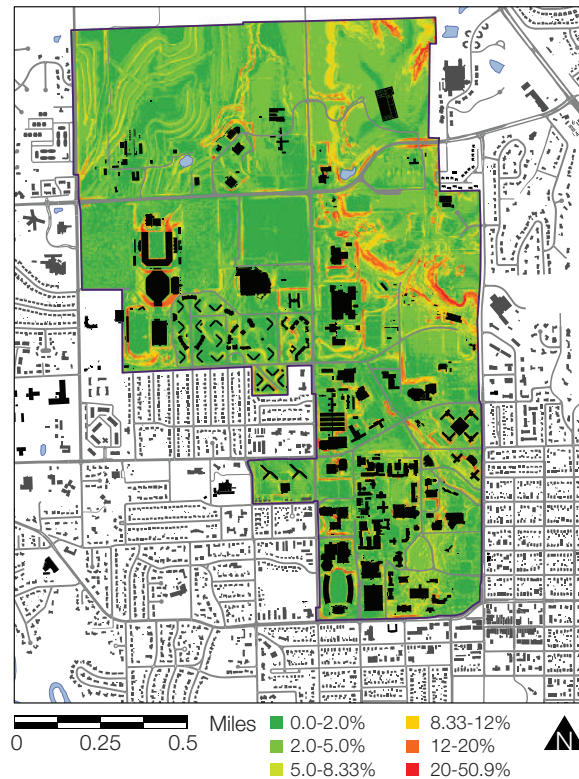
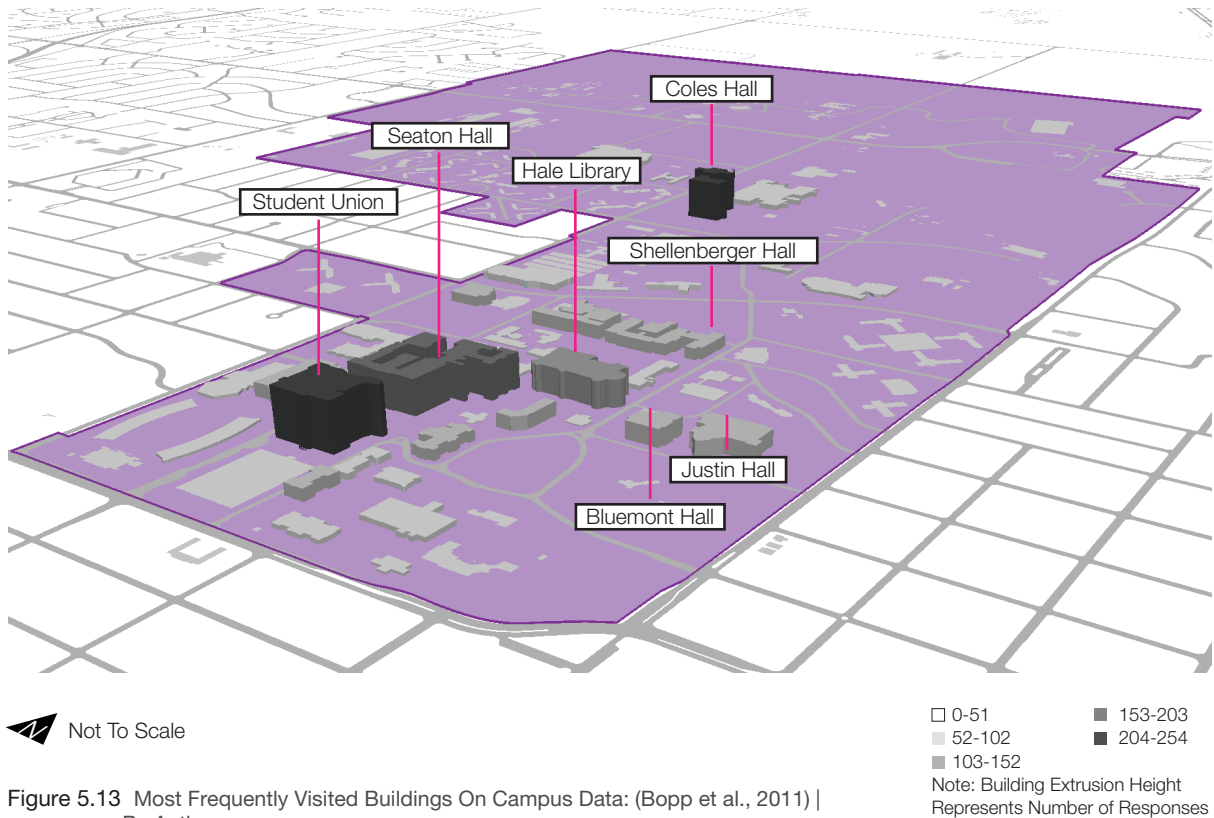


Figure 5.12 Slope Map of Kansas State University |  
By Author

The elevation change on campus occurs in fairly mild slopes over extended distances as seen above. Generally, naturally steep slopes occur only adjacent to Campus Creek and on the more uninhabited northern end of campus. Outside of a few constructed slopes within the core of the campus, the majority of the campus remains ADA accessible and provides great opportunities to explore pedestrianization. The gentle slopes of the campus define its picturesque hilly landscapes and reflect the surrounding Flint Hills geography.

## MOST FREQUENTED CAMPUS BUILDINGS



When identifying a street corridor for closure and redesign it is important to identify a space that receives a large amount of foot traffic from visitors to nearby campus buildings. In order to understand the use patterns of buildings on the campus, survey data was obtained from former Kansas State faculty member Melissa Bopp related to the active commuting patterns of 898 adults in Manhattan, KS (Bopp et al., 2011). The data was collected using an online survey from April through May, 2008 and requested

that students list the buildings on campus that they most frequently visited. These results above allow an increased level of knowledge to select a street for closure as well as understanding where the most access to both walking and bicycling facilities should be provided. As expected, the majority of building most frequented within the campus are within the campus core with the exception of Coles hall, a part of the veterinary medicine complex. Coles hall should therefore be thoughtfully connected to the campus core.



## CAMPUS BICYCLE INFRASTRUCTURE

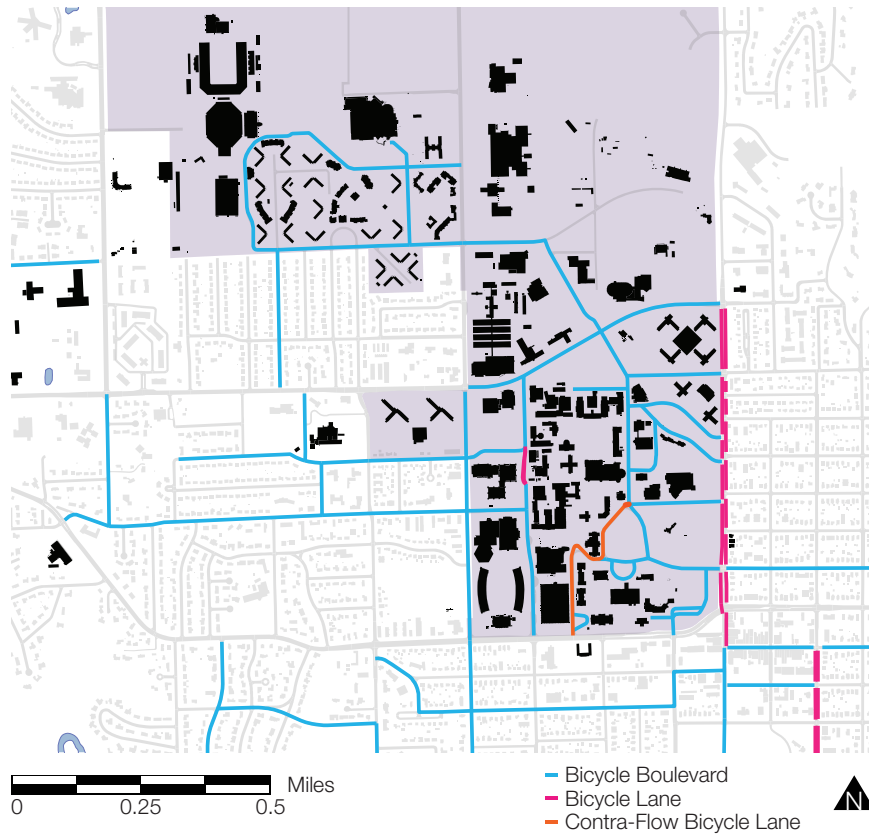


Figure 5.14 Kansas State University Bicycle Infrastructure | By Author

The current bicycle infrastructure within the university and surrounding context is extremely limited, discontinuous, and confusing to navigate. Bicycle boulevards are defined simply by signage or painted street symbols and require vehicles and bicyclists to share limited space within the streets, oftentimes causing conflicts between travel modes. These boulevards make up most of the current bicycling infrastructure within and around the university campus. A trivial two way bicycle lane exists along 17th Street within the campus for a meager several hundred feet, and a contra-flow bicycle lane allows some access through the southern half of the campus core. Overall, navigating the campus on a bicycle proves to be a confusing and stressful experience that can potentially discourage bicyclists.

## CAMPUS PEDESTRIAN INFRASTRUCTURE

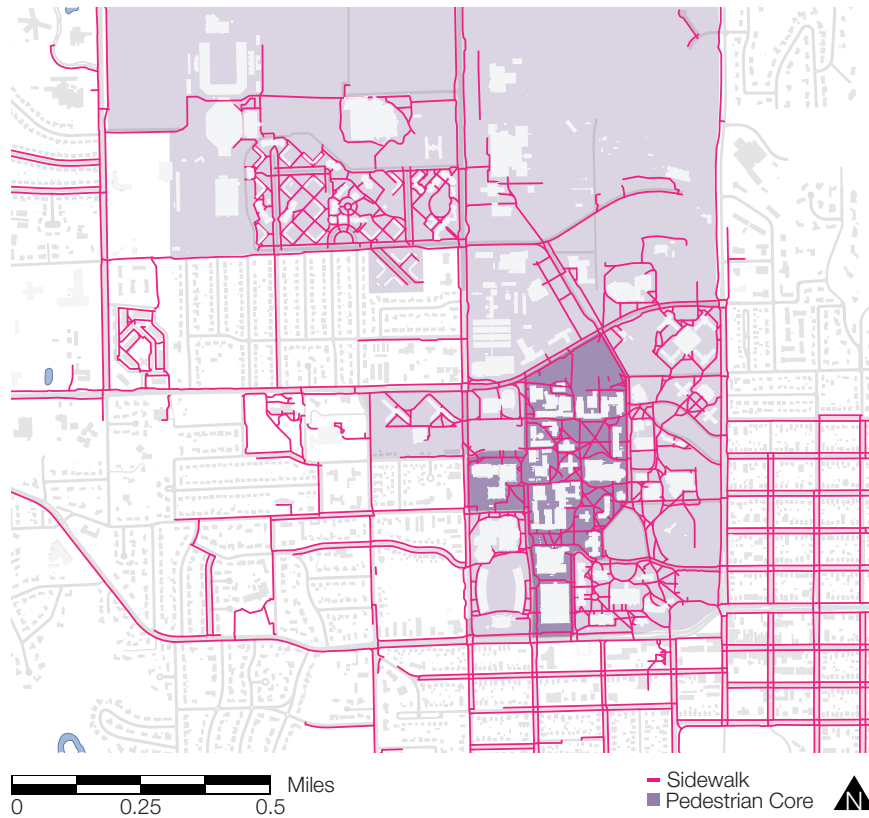


Figure 5.15 Kansas State University Pedestrian Infrastructure | By Author

Pedestrian infrastructure on the campus is currently very well defined and provides a high degree of connectivity to all campus buildings, gateways, and outdoor spaces. A pedestrian only core exists within the center of the campus and allows for a human scale character to be maintained. However, much of the pedestrian infrastructure adjacent to campus streets lacks any spatial or vegetative buffer to protect pedestrians from vehicle conflicts. Within several of the vehicle dominated travel corridors on campus, students surveyed remarked that they felt more anxious and stressed out than they would walking next to open space. While sidewalks exist within much of the campus, there are significant opportunities to improve the user experience when walking along these sidewalks.

# CAMPUS SCALE ANALYSIS: CORE CAMPUS

Once contextual relationships that define active transportation connectivity were identified and understood, the analysis concentrates its focus towards the campus core in more depth. The campus core, defined in Figure 5.16 holds a majority of the student life and academic functions of the campus. As seen previously in Figure 5.13, the campus core encompasses the most visited building within the overall campus boundary. Analysis at this scale is completed to inform the selection of a street corridor most suitable for closure and subsequent conversion to a pedestrian oriented “garden street.” Findings extracted from the online survey conducted by the author and analysis of KDOT pedestrian and bicycle crash data are foundational to the selection of a suitable corridor for redesign. Overall, this scale of analysis examines relationships between pedestrian circulation flows, access to green space, and vehicular infrastructure to allow site selection to occur.

## CORE CAMPUS BOUNDARY

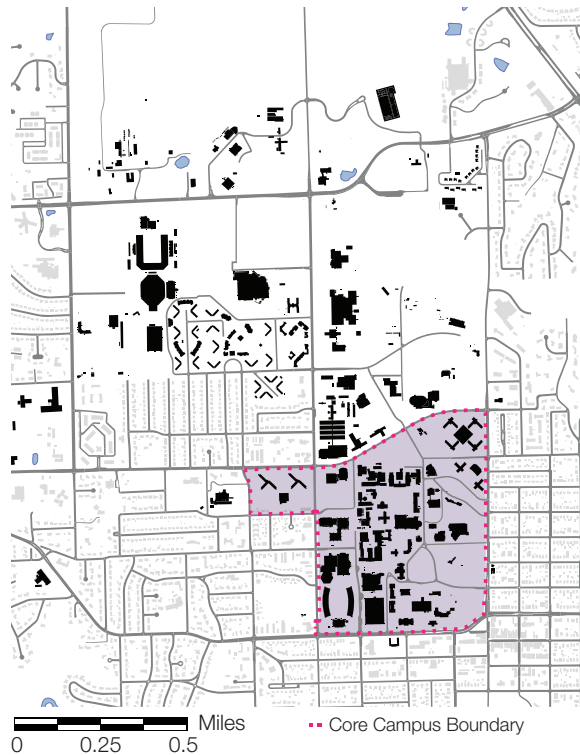


Figure 5.16 Core Campus Boundary | By Author

The core campus is defined by Claflin Road to the North, Manhattan Avenue to the East, Anderson Avenue to the South, and Denison and Sunset Avenue to the West. In order to identify a site with the most potential student users, the corridor selection process is limited to streets within this boundary. Several vehicular streets exist within this core campus boundary and are examined for potential removal.

## CORE CAMPUS GATEWAYS

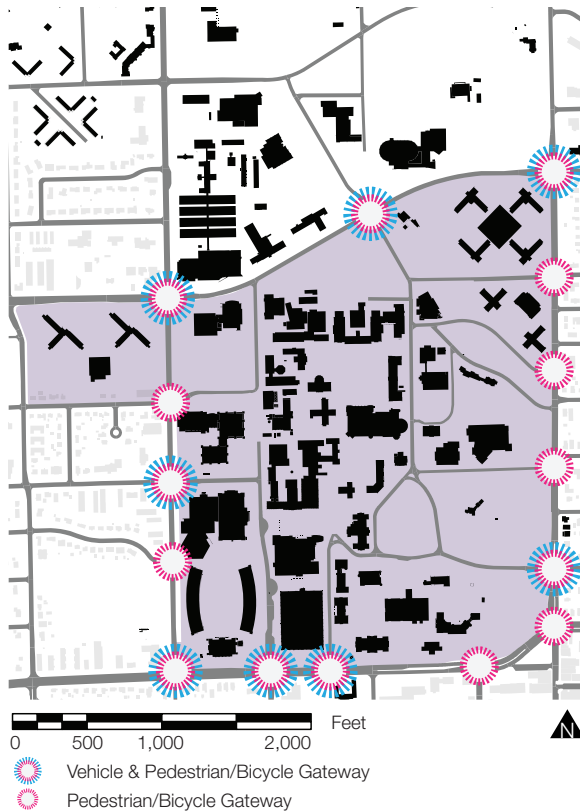


Figure 5.17 Core Campus Gateways | By Author

There are fifteen major access points or gateways into the core campus of Kansas State University. All fifteen gateways currently allow access to bicyclists and pedestrians, and of these fifteen, eight allow vehicular entrance into the campus core. Understanding the flows of pedestrians, bicyclists, and vehicles through the campus informed selection of a corridor for closure that would minimize disruption of municipal traffic patterns while maximizing the exposure to students circulating to and from class.

## PEDESTRIAN CIRCULATION HIERARCHY

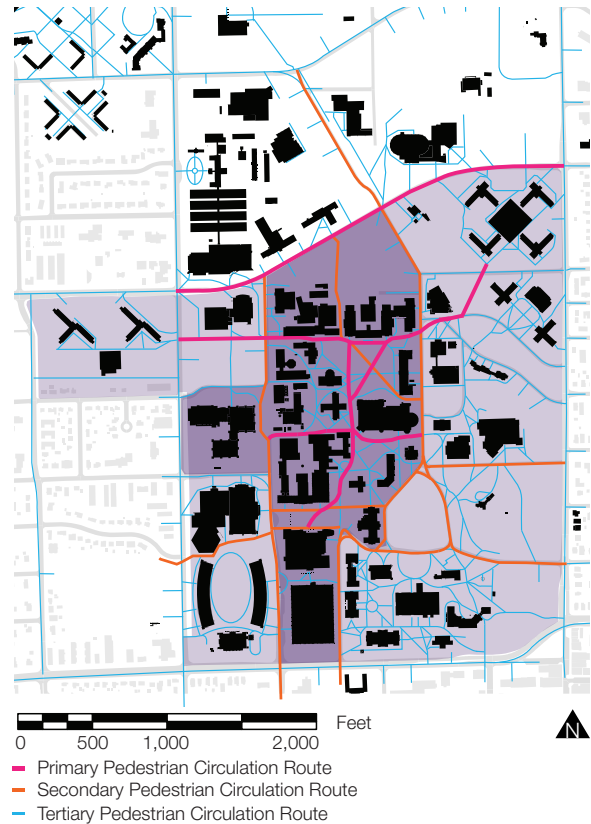


Figure 5.18 Pedestrian Circulation Hierarchy | By Author

Pedestrian circulation within the core campus have been categorized into primary, secondary, and tertiary routes to visualize the connections between various campus buildings and spaces. The majority of primary circulation routes unsurprisingly exist within the car free campus zone designated by the dark purple above. Several secondary pedestrian circulation routes are adjacent to busy campus streets and provide opportunities for significant improvement.



## CORE CAMPUS STREETS & PARKING



Figure 5.20 Core Campus Streets & Parking | By Author

Several parking lots within the core of the Kansas State University campus reduce the aesthetic appeal and potential for social interaction within the most visited areas of the campus. The interaction between vehicles, pedestrians, and bicyclists within the bustling streetscapes of the campus often leads to confusion, conflict, and collisions. These streets and parking lots provide a variety of opportunities to reclaim multi-functional space within the core of campus.

## CORE CAMPUS GREEN SPACE

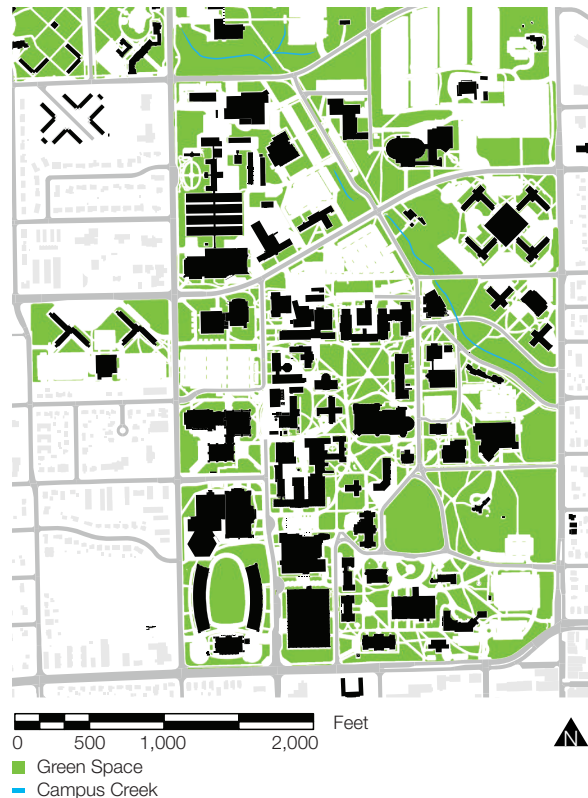


Figure 5.19 Core Campus Green Space | By Author

The majority of the campus core, as seen above, is provided with a substantial amount of access to green space and natural environments. The spatial development pattern of the University frames several large, noteworthy quadrangles, however, several spaces framed by building masses which also provide vehicular circulation are severely limited in terms of the amount of access to nature they provide. These spaces often act as primary pedestrian circulation routes as well.

## PEDESTRIAN/VEHICLE CRASH FREQUENCY

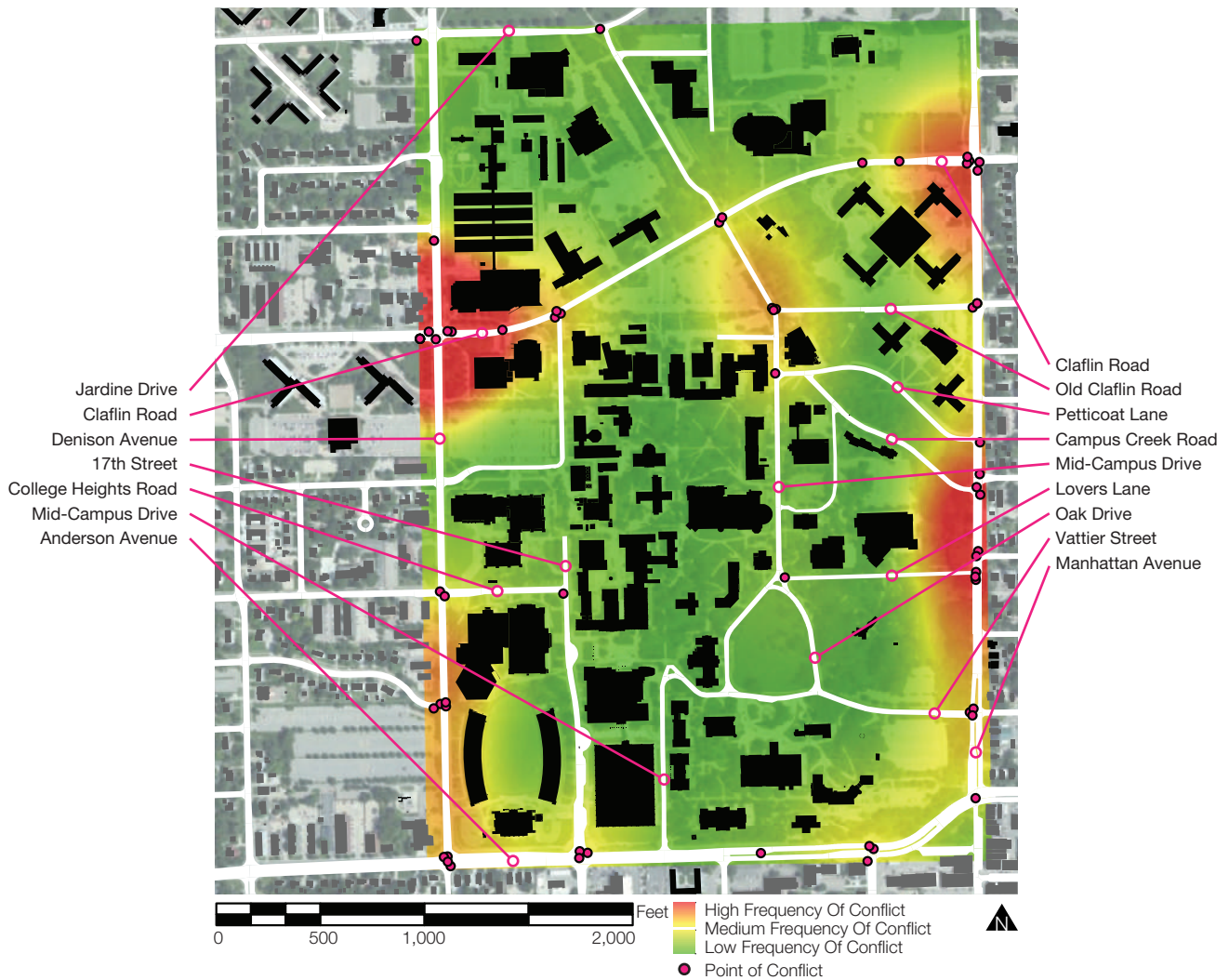


Figure 5.21 Pedestrian/Vehicle Crash Frequency | By Author

Crash data obtained from the Kansas Department of Transportation (KDOT) identified 64 conflicts between a vehicle and pedestrian within the campus boundary between January, 2000 and December, 2014. This was analyzed and projected as a kernel density heat map to determine the most dangerous places to walk on the Kansas State University campus. Unsurprisingly, the majority of pedestrian/vehicle conflicts occurred on the perimeter of the campus as pedestrians cross the heavier trafficked streets that bound the campus. However, hot spots along the Mid-Campus Drive corridor near its intersection with Claffin Road identify it as being the most dangerous pedestrian space on the campus.

## BICYCLIST/VEHICLE CRASH FREQUENCY

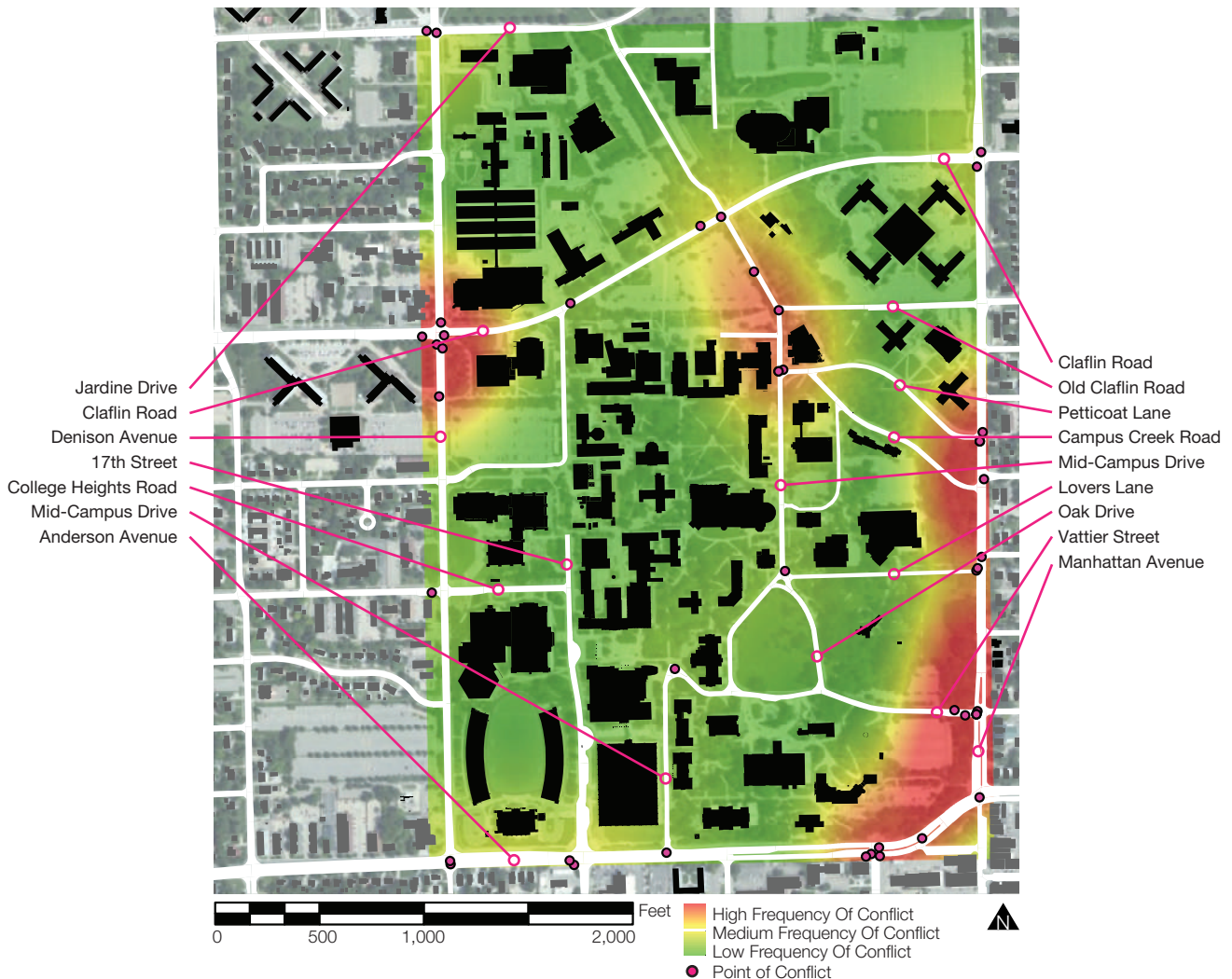


Figure 5.22 Bicyclist/Vehicle Crash Frequency | By Author

Crash data obtained from the Kansas Department of Transportation (KDOT) identified 46 conflicts between a vehicle and bicyclist within the campus boundary between January, 2000 and December, 2014. This was analyzed and projected as a kernel density heat map to determine the most dangerous places to bicycle on the Kansas State University campus. Unsurprisingly, the majority of pedestrian/vehicle conflicts occurred on the perimeter of the campus as pedestrians cross the heavier trafficked streets that bound the campus. However, hot spots along the Mid-Campus Drive corridor near its intersection with Claflin Road identify it as being the most dangerous space for bicycling on the campus.



## STRESS AND ANXIETY INDUCING OUTDOOR SPACES

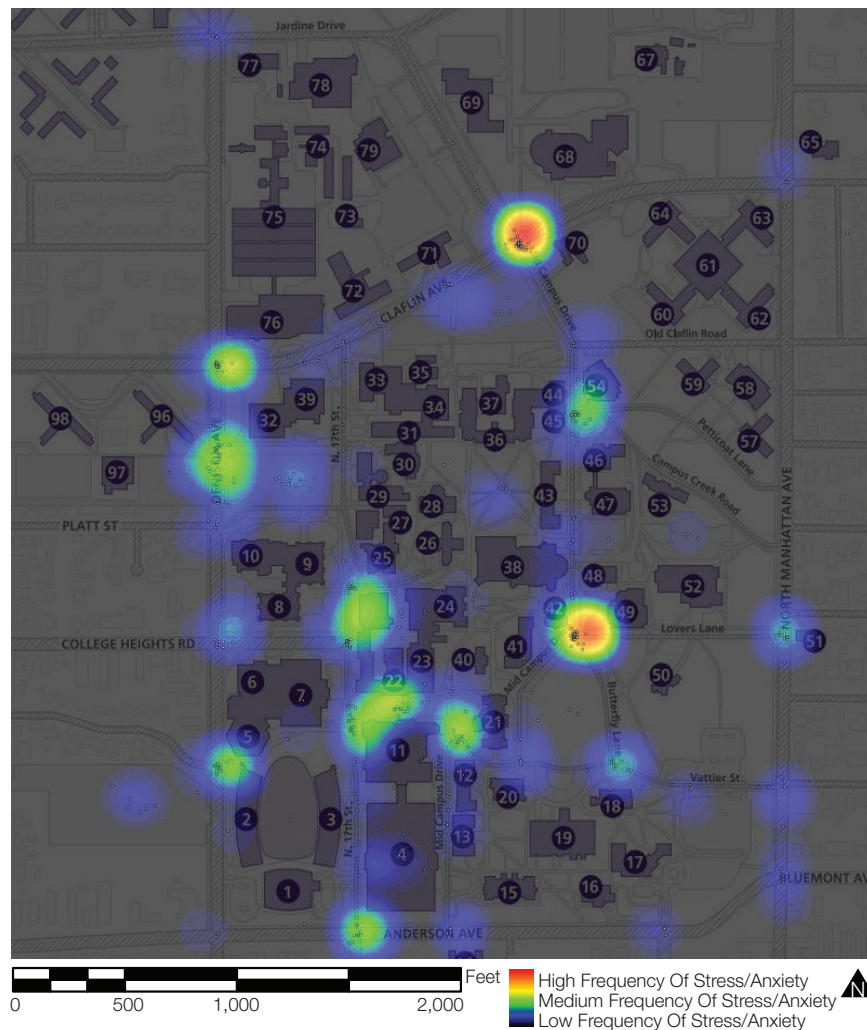


Figure 5.23 Stress And Anxiety Inducing Outdoor Spaces | By Author

The survey administered to students at Kansas State University asked respondents to identify outdoor spaces on campus that stressed them out or made them anxious as a pedestrian or bicyclist. The results, illustrated as a heat map above, revealed very interesting trends as nearly every hot spot involves interaction between pedestrians/bicyclists and automobiles, illustrating a close relationship between the interaction of these travel modes and an individual's stress or anxiety. Two nodes of extremely high stress and anxiety are located at the intersection of Mid-Campus Drive with Claflin Road and Lovers Lane. These clusters of responses present an opportunity for a designed intervention which mitigates stress and anxiety.



# STREET CORRIDOR SELECTION

## STREET LEAST USED TO PASS THROUGH CAMPUS

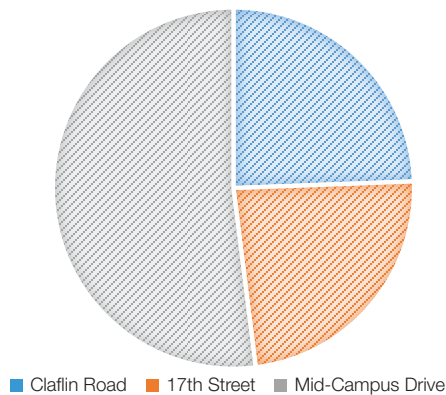
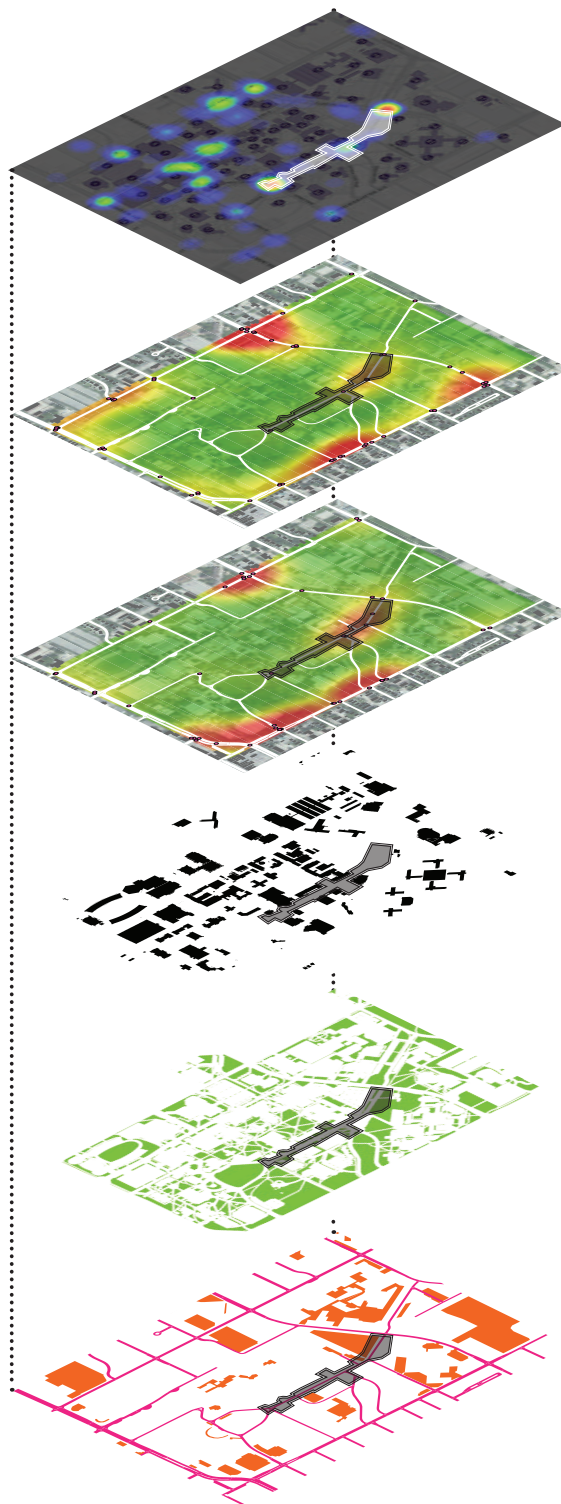


Figure 5.24 Least Used Campus Streets | By Author

In order to reduce the amount of impact on automobile traffic flows within the surrounding community, it was important to identify the street least used by students “to cut through campus in order to arrive at a destination outside the campus limits.” As previously discussed, proposals for street closure and conversion of Claflin Road, 17th Street, and Mid-Campus Drive had been generated through the 2012 Kansas State University Master Plan. In order to limit the focus and scope of this project, one suitable street corridor is identified for exploration into a designed solution. The online survey conducted by the author identified definitively that Mid-Campus Drive was used by automobiles least often to cut through campus. Therefore, it provides the highest degree of suitability for closure to daily vehicular traffic by limiting the impact on surrounding vehicular traffic patterns.

The site analysis discussed to this point at the campus and core campus scales culminates in the selection of an individual street corridor for further exploration into design changes to the built environment which shape a more restorative and active environment for students to engage with. A variety of analysis themes ranging from green space access to active transportation modal safety were inventoried and analyzed to identify this single corridor. Through this comprehensive analysis, Mid-Campus Drive emerged as the most suitable street corridor within the core campus to pursue an investigation into application of the restorative and active design frameworks identified in Chapter 4. Figure 5.25 on the facing page illustrates the synthesis of these themes and identifies Mid-Campus Drive within the greater context of the analysis maps. The Mid-Campus Drive Corridor extends for 1800 feet within the core campus of Kansas State University, and encompasses 10 current academic buildings including the heavily trafficked campus library, providing an opportunity to shape many students’ experiences as they travel to and from class. Additionally, the corridor provides direct access to Campus Creek, an underutilized natural amenity within the campus that holds a large amount of potential as a restorative and active space within the campus boundary. By developing a site scale design proposal for Mid-Campus Drive that operates alongside several campus scale planning and design solutions, students will have increased opportunities to engage in activities that promote a more mentally and physically healthy lifestyle.



## STRESSFUL OUTDOOR SPACES

A survey of Kansas State University students identified that three major vehicular intersections along the Mid-Campus Drive corridor are the most stress or anxiety inducing outdoor spaces on the campus as a pedestrian or cyclist.

## UNSAFE SPACES FOR PEDESTRIANS

Analysis of KDOT crash data within the campus and along its periphery identified the Mid-Campus Drive corridor as the most dangerous space within campus to walk. The campus edges also contain many dangerous hot spots.

## UNSAFE SPACES FOR BICYCLISTS

Analysis of KDOT crash data within the campus and along its periphery identified the Mid-Campus Drive corridor as the most dangerous space within campus to bicycle. The campus edges also contain many dangerous hot spots.

## FIGURE GROUND RELATIONSHIPS

The Mid-Campus Drive corridor is the most dense vehicular corridor within the campus. This high degree of spatial enclosure provides an opportunity to shape a series of focused garden spaces that can serve many students.

## ACCESS TO GREEN SPACE

Currently, the Mid-Campus Drive corridor is lacking accessible or aesthetically pleasing green space to be used by students. Much of the already little space within this dense corridor is given over to the movement of automobiles.

## VEHICULAR INFRASTRUCTURE

Two large parking lots along the Mid-Campus Drive corridor create spaces that are out of scale with pedestrians and bicyclists. These parking lots are an eyesore within the campus core and limit the function and value of the campus core.

Figure 5.25 Site Analysis Synthesis | By Author

# CORRIDOR SCALE ANALYSIS

Once analysis at the core campus scale had identified Mid-Campus Drive as the most suitable street corridor within the Kansas State University campus for a design proposal, further analysis was undertaken at the corridor scale. The explicit corridor boundary defined for analysis and design is defined in Figure 5.25 to the right. The corridor is defined as the current Mid-Campus Drive right of way plus adjacent open spaces between Claflin Road to the North and Lovers Lane to the South. Analysis at this scale is intended to inform specific site scale design responses and decisions by understanding the current spatial characteristics, use patterns, and physical opportunities and constraints. Analysis of specific restorative and active transportation qualities within the corridor identified that the corridor, in its current condition, is lacking many key spatial requirements of active and restorative built environments and holds vast room for improvement through changes to this built environment. Overall, findings extracted out of this analysis are directly translated into the shaping of an active and restorative campus experience through corridor and site scale design described in the forthcoming chapter.

## CORRIDOR SCALE ANALYSIS/DESIGN LIMITS

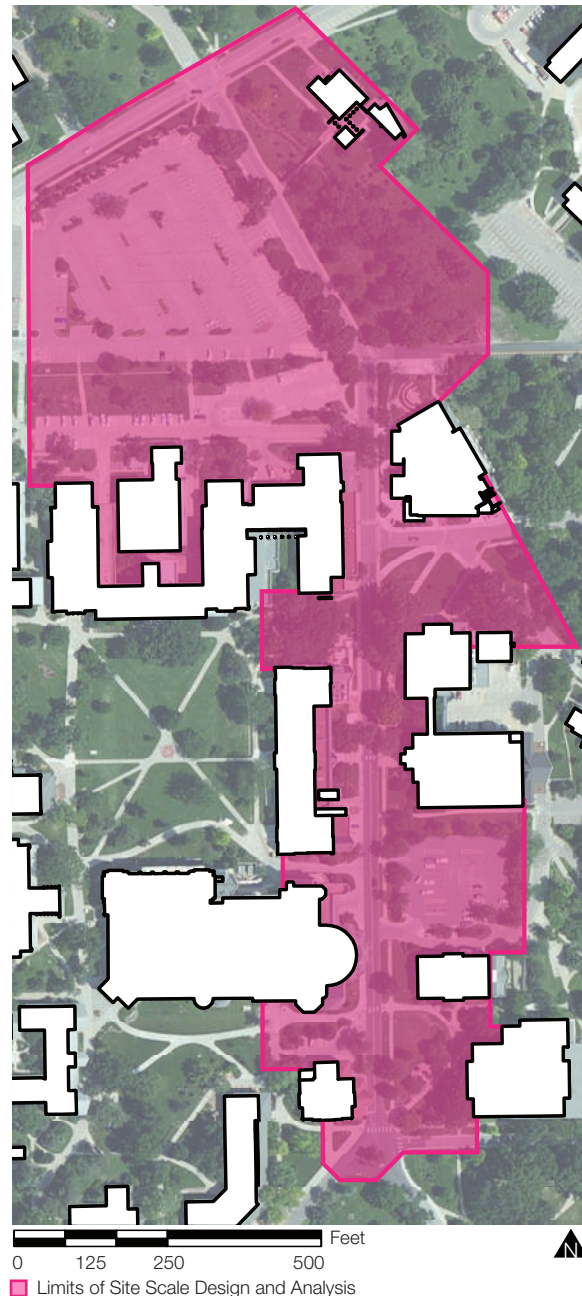


Figure 5.26 Corridor Scale Analysis/Design Limits | By Author

## CORRIDOR SCALE TOPOGRAPHIC RELIEF

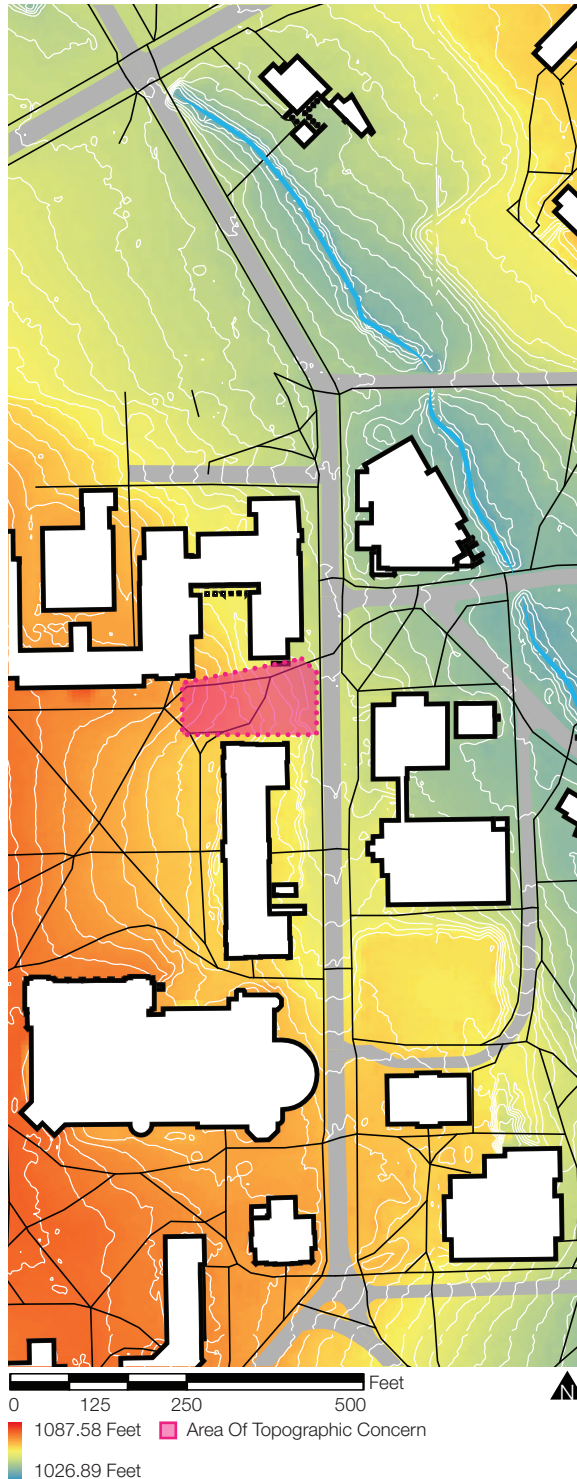


Figure 5.27 Corridor Scale Topographic Relief | By Author

The Mid-Campus Drive corridor has a localized high point at its southernmost intersection with Lovers Lane illustrated by the warmer colors in Figure 5.26 shown to the left. The corridor generally decreases in elevation as one approaches its North and East bounds. Campus Creek, the localized low point of this elevation analysis flows through the northeastern corner of the corridor and is the principal collector of all water which falls within the corridor. Slopes within this corridor are generally limited to a comfortable 2-4%, although one area within the corridor (identified by the magenta bounding box) is characterized by slopes up to 6.60%. In order to allow increased ADA accessibility, a design solution should address this area in particular. Overall, for the purposes of the conceptual nature of this master's project, the majority of the Mid-Campus Drive corridor does not require any drastic attention to grading solutions. Nonetheless, all design decisions will be made to align with current corridor elevations and building entrance elevations.



The primary flows of pedestrians within the corridor occur parallel to Mid-Campus Drive to the North and South as well as intersecting Mid-Campus Drive along Claflin Street to the North, Lovers Lane to the South, and directly south of Shellenberger Hall and the Leadership Studies Building near the midpoint of the corridor. These primary pedestrian flows are accommodated within fairly restrictive (6-8 foot wide) sidewalks which oftentimes have no spatial buffer to protect pedestrians from the adjacent vehicular traffic. The intersection of primary pedestrian paths at the North and South endpoints as well as the midpoint of the corridor are the most chaotic spaces within the corridor and provide the most potential conflict between different transportation modes. These intersections also act as the primary nodes of social activity within the corridor as the most unexpected encounters with peers occur there. Secondary movement of pedestrians occurs primarily to connect the main pedestrian spines to buildings and outdoor spaces. These pathways are generally the same size as the primary circulation paths although they receive significantly less foot traffic. The tertiary routes, in most instances, provide either short distance access directly to a building entrance or serve as less frequented intersection crossings.

## CORRIDOR SCALE PEDESTRIAN NETWORK

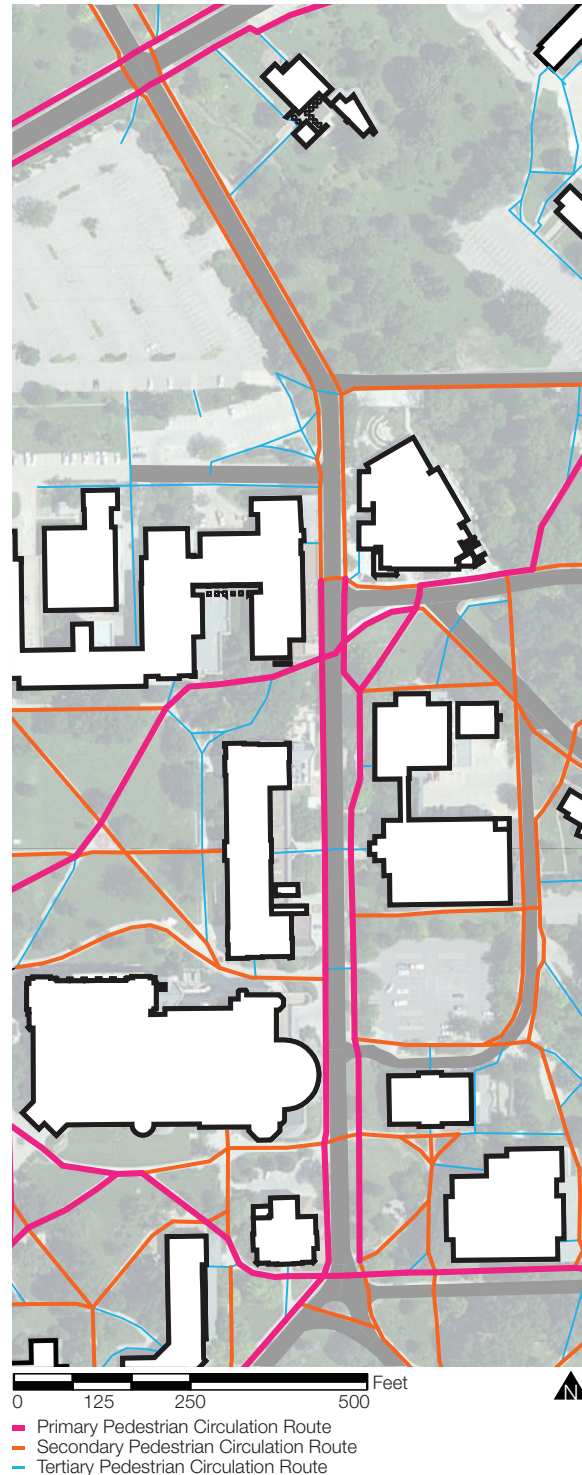


Figure 5.28 Corridor Scale Pedestrian Network | By Author

## CORRIDOR SCALE BICYCLE NETWORK

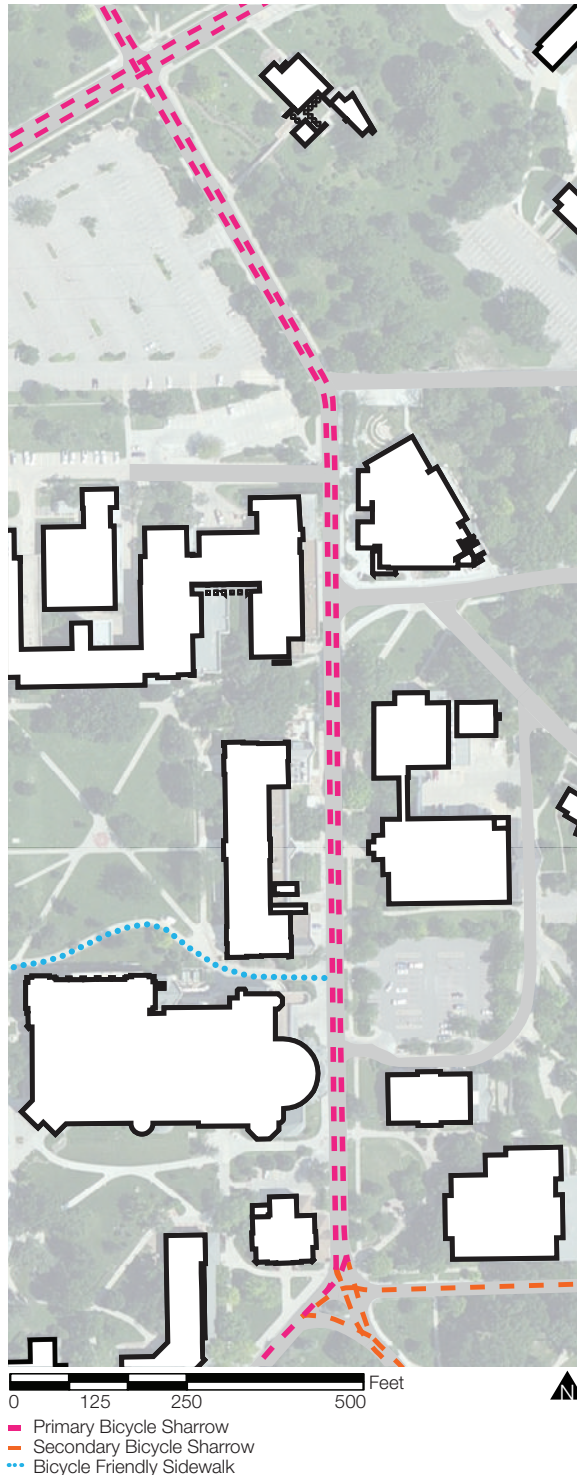


Figure 5.29 Corridor Scale Bicycle Network | By Author

As identified within the previous campus scale analysis, there is very little dedicated bicycle infrastructure within the Kansas State University campus. Within the Mid-Campus Drive corridor, bicyclists are required to share the street with vehicles in what is referred to as a “sharrow.” These bicycle sharrows are marked by paint on the street as well as signage adjacent to the street encouraging automobile drivers to “share the road” with bicyclists. The bicycle sharrows cause frustration for both modes of travel as the speed of bicyclists often annoys automobile drivers that are capable of moving at higher speeds. Additionally, sharrows are bicyclists least preferred form of infrastructure (Oliver, 2011) because they oftentimes feel unsafe as vehicles drive behind and alongside them. With the exception of the bicycle friendly sidewalk called out in Figure 5.28, the campus core is considered a “dismount zone,” requiring all bicyclists to park or walk their bicycles to avoid conflict within the pedestrian filled sidewalks. Overall, through the author’s survey, it was identified that the distinct lack of dedicated bicycle infrastructure within the Kansas State University campus is a barrier many students decision to bicycle to campus on a regular basis.

In its current form, the Mid-Campus Drive corridor is visually and spatially dominated by vehicular infrastructure. The pedestrian experience oftentimes feels like an afterthought accommodated only after allocating an appropriate amount of space to the needs of the automobile. Claflin Road, on the North boundary of the corridor is the only primary vehicular circulation route within the campus as it services through campus travel along with inter campus travel and drop off functions. Several large parking lots along the North boundary of the corridor as well as adjacent to the Chemistry/Biochemistry building create an environment identified by students through survey as stress and anxiety inducing. These environments lack any substantial amount of exposure to natural plant materials of restorative elements, providing a unique opportunity for a restorative intervention. Within the most dense areas of the corridor, Mid-Campus Drive occupies up to 25% of the open space, thereby significantly limiting the ability of the corridor to allow restoration to students. Additionally, Mid-Campus Drive itself acts as a physical barrier to East-West pedestrian and bicyclist movement across the campus.

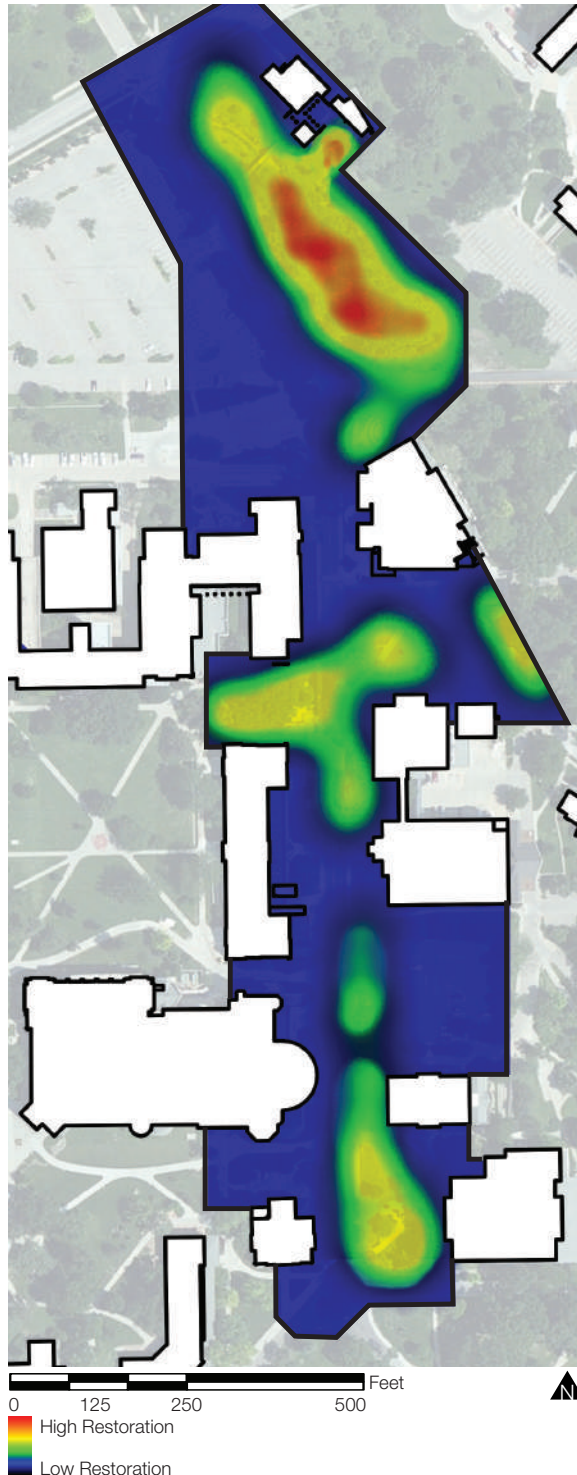
## CORRIDOR SCALE VEHICULAR NETWORK



Figure 5.30 Corridor Scale Vehicular Network | By Author



## CORRIDOR RESTORATION POTENTIAL



In its current condition, the Mid-Campus Drive corridor provides very limited opportunities for students to become mentally restored through engagement with natural settings. Figure 5.30 identifies the existing levels of restoration potential within the corridor based on proximity to open space, vehicular traffic, and expansive parking lots or hardscaped areas. As Campus Creek passes through the North end of the corridor boundary and is framed by large swaths of open space, it provides the largest space for restoration to occur. On the South end of the corridor, an intimate sunken gathering space surrounded by aesthetically pleasing shrubs, perennials, and trees provides the highest degree of restoration potential to students. Overall, as seen in Figure 5.30, a majority of the corridor provides very limited interaction with nature resulting in an extremely low ability to allow mental restoration to occur within the student body. A designed solution must identify creative ways of weaving a naturalized setting into the campus while facilitating the movement of thousands of students, faculty, staff, and visitors every day.

Figure 5.31 Corridor Restoration Potential | By Author



# SITE PHOTOGRAPHY INVENTORY

Photography was used extensively as a communication tool to illustrate existing site conditions within the Mid-Campus Drive corridor. The lack of current affordances to encourage active transportation and mental restoration is documented through the site photography. Additionally, site observation and photography assisted in the definition of primary opportunities and constraints identified in Figure 5.54 later in this chapter. Recognition and subsequent response to these existing site conditions, opportunities, and constraints grounds the project in site realities and allows the design proposal to connect seamlessly with the context. Figure 5.31 to the right identifies the location and direction of all site photographs which appear on the following pages.

CORRIDOR PHOTOGRAPHY KEY MAP

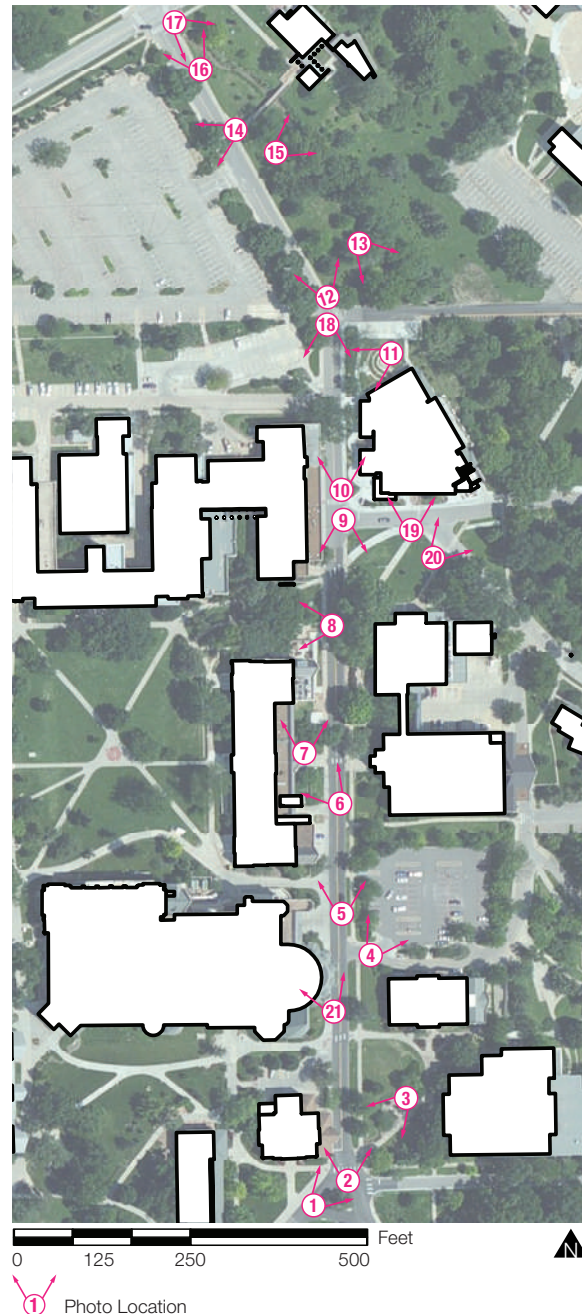


Figure 5.32 Corridor Photography Key Map | By Author

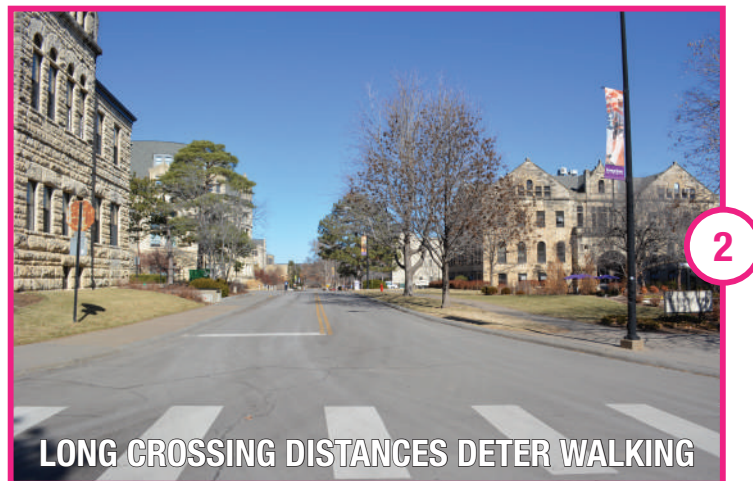


Figure 5.33 (Top) Intersection Alignment Causes Confusion | By Author  
Figure 5.34 (Middle) Long Crossing Distances Deter Walking | By Author  
Figure 5.35 (Bottom) Gathering Space Allows Socialization | By Author

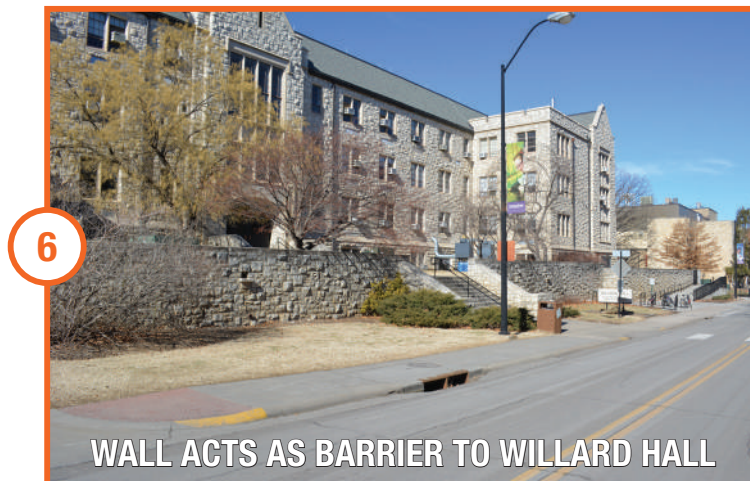


Figure 5.36 (Top) Parking Lot Is An Eyesore To Passersby | By Author

Figure 5.37 (Middle) Corridor Dominated By Vehicular Access | By Author

Figure 5.38 (Bottom) Wall Acts As Barrier To Willard Hall | By Author





Figure 5.39 (Top) Arts Terrace Lacks Functionality | By Author

Figure 5.40 (Middle) Infrastructure Interrupts Views To Quad | By Author

Figure 5.41 (Bottom) Bicycles Share Street Space With Vehicles | By Author





Figure 5.42 (Top) Street Dominates Pedestrian Experience | By Author

Figure 5.43 (Middle) Amphitheater Allows Outdoor Classes | By Author

Figure 5.44 (Bottom) No Separation Between Street & Sidewalk | By Author



Figure 5.45 (Top) Cut Banks Within Degraded Campus Creek | By Author

Figure 5.46 (Middle) Vast Parking Lot Limits Restoration | By Author

Figure 5.47 (Bottom) Unprogrammed Space Limits Creek Access | By Author





Figure 5.48 (Top) Intersection Creates Chaotic Experience | By Author

Figure 5.49 (Middle) Lack Of Easy Access To Natural Amenities | By Author

Figure 5.50 (Bottom) Pedestrians Displaced to Street Edges | By Author



Figure 5.51 (Top) Outdoor Dining/Seating Spaces Are Limited | By Author

Figure 5.52 (Middle) Opportunity To Create Active “Hub” | By Author

Figure 5.53 (Bottom) Library Has Trivial Contextual Relationship | By Author



## BUILDING FUNCTIONS AND ENTRANCES

### INTERNATIONAL STUDENT CENTER

*International Student and Scholar Services*

Potential opportunity to create spaces that facilitate connections between international students and domestic students.

### LEADERSHIP STUDIES BUILDING

*Staley School of Leadership Studies*

Opportunity to create outdoor seating areas to service existing coffee shop while giving nearby freshmen spaces to study.

### SHELLENBERGER HALL

*Department of Grain Science and Industry*

Opportunity to showcase food production within the campus and utilize produce grown on campus within bakery products.

### KING HALL

*Department of Chemistry*

Opportunity to enhance the visual drama of the building entrance and create an outdoor "learning laboratory."

### WILLARD HALL

*Department of Art*

Opportunity to create an outdoor sculpture garden to showcase student work both on the existing terrace and within the corridor.

### CHEMISTRY/BIOCHEMISTRY BUILDING

*Departments of Chemistry and Biochemistry*

Spatial enclosure created within this zone of the corridor creates an opportunity to shape an introspective, enclosed space.

### HALE LIBRARY

*Main Campus Library*

Opportunity to create more private, intimate spaces to allow students to read and study while engaging with a natural setting.

### DICKENS HALL

*Departments of Statistics and Geography*

Large "front yard" space provides an opportunity to create outdoor communal dining to support the library's coffee shop.

### HOLTON HALL

*Students Services + Office of Student Life*

Opportunity to shape a "front porch" for the corridor that welcomes current and future students to the new garden street.

### BLUEMONT HALL

*College of Education + Department of Psychology*

Large open space affords opportunity to create a introspective walking garden for potential psychological studies by students.



Figure 5.54 Building Functions and Entrances | By Author

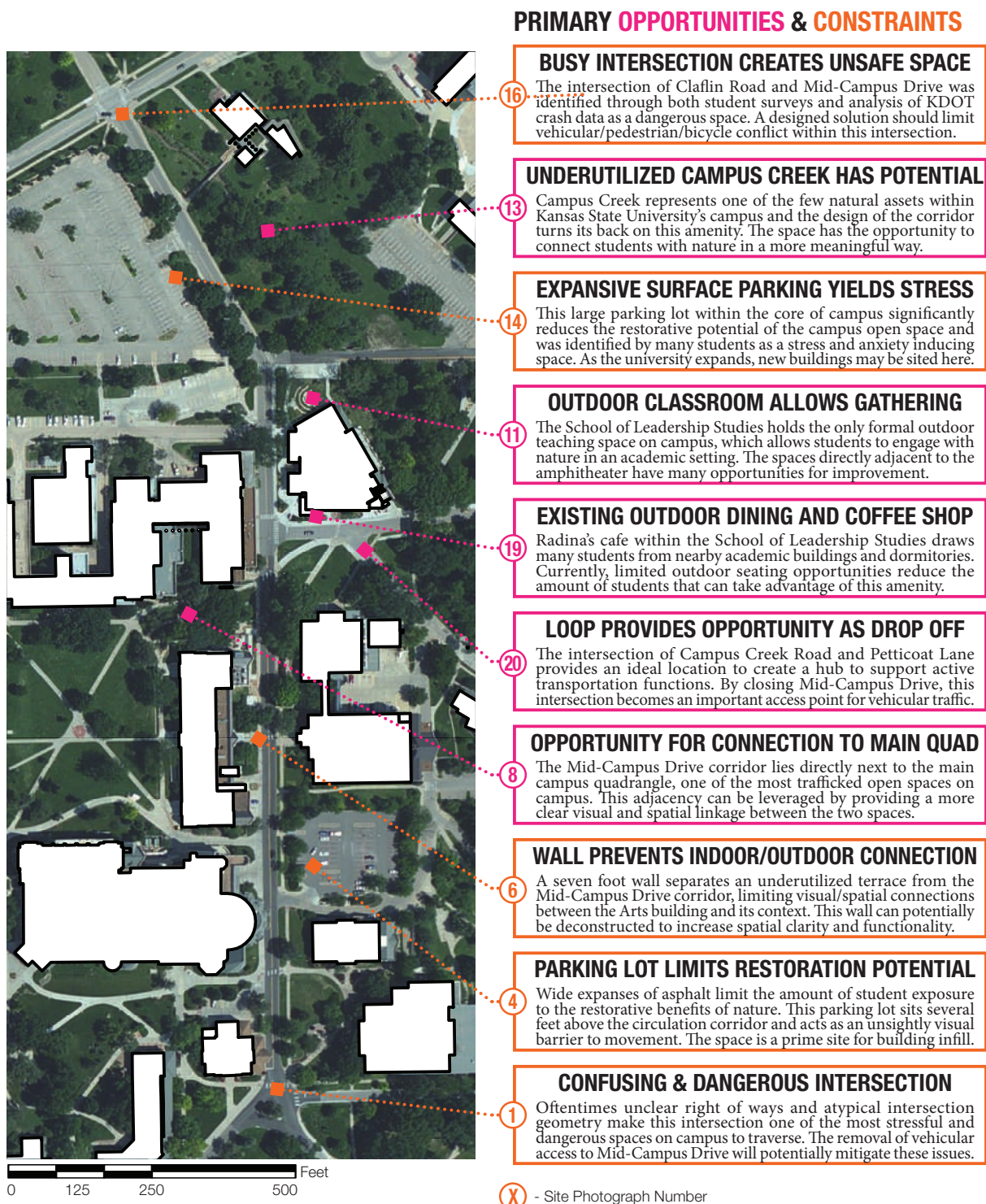


Figure 5.55 Primary Opportunities and Constraints | By Author



# CHILLED WATER MASTER PLAN

Figure 5.55 to the right illustrates the construction projects within the campus scheduled for initiation or completion between Spring 2015 and Fall 2017 including street conversion projects within 17th Street and Mid-Campus Drive. The retrofit of the Mid-Campus Drive corridor is scheduled for completion during the Summer of 2016 (Swanson, 2015) and provides tremendous opportunities to create an active and restorative linear space within the campus core to improve students mental and physical health.



180

## MID-CAMPUS DRIVE DESIGN PROPOSAL



Not To Scale

Figure 5.57 Mid-Campus Drive Design Proposal  
| Courtesy of (Swanson, 2015)

## PROJECT CONSTRAINTS & POTENTIAL

Due to the constraints of time, money, and maintenance associated with projects outside of academia, the current design of the Mid-Campus Drive is more limited in scope and restorative/active potential than the author's proposal explored in the next chapter. The primary goals of the university's proposal is to increase the pedestrian safety within the campus core while also creating a more aesthetically pleasing sense of place (Swanson, 2015). Essentially, the current design proposes capping the current extent of Mid-Campus Drive with a concrete pedestrian path between Lovers Lane and Old Claflin Road. Several sitting areas, planting beds, and gateways have been programmed into the corridor in order to increase student interaction and comfort (Swanson, 2015). While the proposal is certainly a big step forward towards a more active and restorative campus environment, the Mid-Campus Drive corridor holds potential to become a physically active garden street by directing more attention to the planning and design themes introduced within the Synthesis chapter of this document. Overall, the proposal explored in the subsequent chapter seeks to improve on many of the limitation of the university's current design.

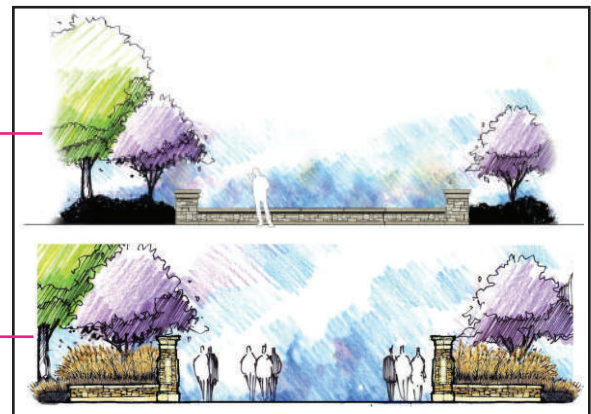
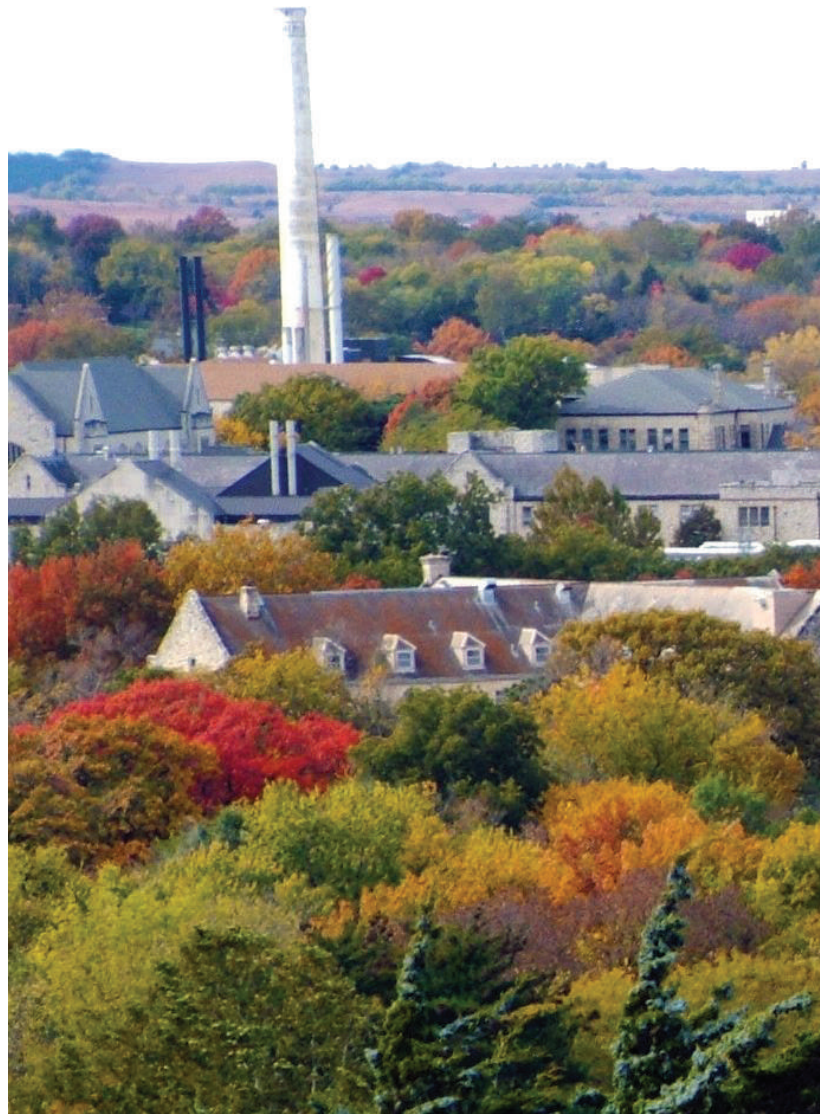


Figure 5.58 Design Details | Courtesy of (Swanson, 2015)



# CHAPTER SUMMARY

Altogether, the site analysis described within this chapter was conducted to identify general campus conditions, select a vehicular corridor for further investigation, and ultimately understand the specific active and restorative affordances within the corridor. The identification and analysis of existing circulation patterns as well as exposure to natural environments is integral to this campus and corridor exploration. These findings are used to inform application of the design framework described in the previous chapter within Kansas State University, a representative case campus, in the forthcoming chapter. This extensive investigation into site conditions and human use patterns informs design resolutions at the campus, corridor, and site scales. The final design product looks to improve upon the oftentimes chaotic and disjointed pedestrian and bicycle experience identified through this analysis.



The campus should be perceived as ***“a little hamlet of thrifty artisans built into the heart of rich, well tilled fields”***

John Anderson  
University President  
(1873-1879)  
(Weisenburger, 1973)



06

## DESIGN APPLICATION

Kansas State University's campus is envisioned as an active and restorative environment to promote students' mental and physical health and wellbeing through proposed changes to the built environment. These changes are explored at three unique, yet undeniably interrelated scales. The framework outlined in the synthesis chapter of the report informs all campus, corridor, and site scale decisions. This design represents the culminating answer to the project's guiding research questions.



# INTRODUCTION

## DESIGN PHILOSOPHY

As defined in the first chapter of this report, the intent of the research methodology undertaken to complete this project is to determine strategies to promote the mental and physical health of university students through designed changes to the campus street environment. Since these strategies have been defined through the creation of active and restorative design frameworks, this chapter explores application of these frameworks within Kansas State University, a representative case of a typical university campus. The design intent of this project aligns with the research intent previously defined. It seeks first to create a calm, social, and attractive human scale environment to encourage walking and bicycling within the university campus and second; to create a corridor with a variety of intimate gardens and social spaces that provide restoration to students inhabiting and circulating through the space.

## DESIGN APPROACH

The design portion of the project was approached with an inquisitive mind set as the author sought to artistically shape the direction of an entire university campus from a conceptually grounded series of research questions. Significant efforts were made to investigate successful examples of built campus, active, and restorative environments outside the bounds of the cases studies described in Chapter 2. An interdisciplinary approach to evidence based design application based primarily on health related research through literature review provides relevant answers to the project's research questions. The author constantly sought to find a balance between real world application and conceptual utopian design in order to arrive at a progressive yet realistic solution which is inherently tied to site analysis, code requirements, and infrastructural limitations. It was imperative to constantly reflect back on the effects that each specific planning and design decision had on the experience of a student moving through the campus space as design development evolved.

## ITERATIVE DESIGN PROCESS

As Chapter 4 explained, planning and design decisions within the scope of this project are approached within three interrelated and nested scales. Design decisions at each scale were not made independent of the other scales, but rather; a free form and self-referential approach defined that design process strategy. Decisions at each scale influenced all scales in a variety of dynamic ways. General systems frameworks and bold strokes of design were established at the campus scale and systematically polished and adjusted in a non-linear fashion. Figure 6.1 to the right illustrates this process as the relationship between campus scale systems and intimate sub-spaces was explored and established. By approaching this project through frameworks established at three scales, the final product is much more legible and easy to illustrate for a wide variety of audiences with quite different backgrounds and interests.

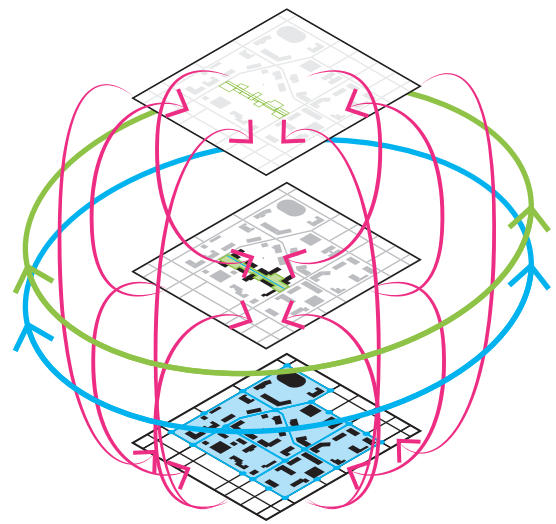


Figure 6.1 Design Process | By Author

# DESIGN CONCEPT

## DESIGN NARRATIVE

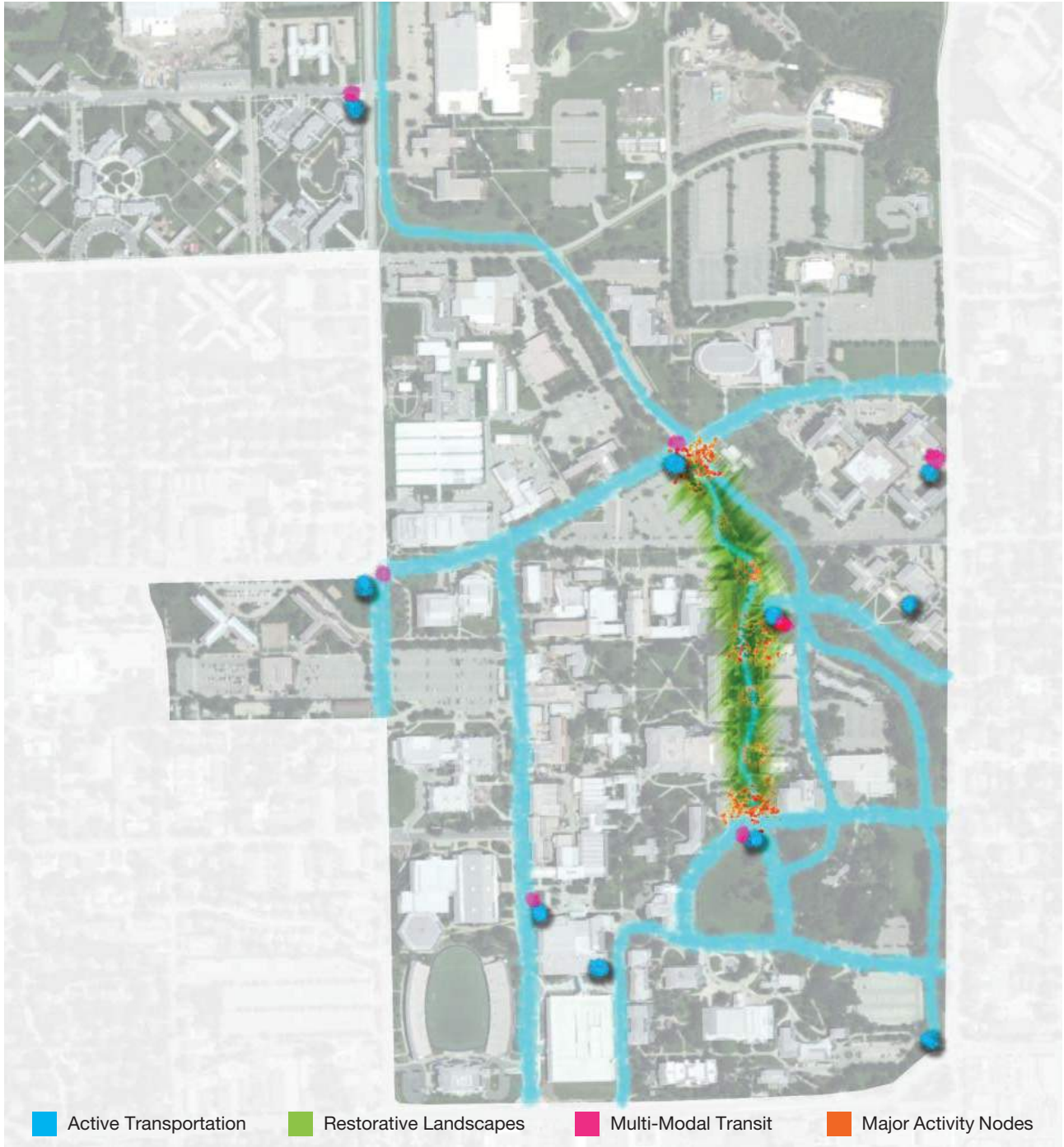
The topics of restorative landscape design and active transportation chosen for research and design exploration within this Master's project and report may at first appear to be unrelated and even in some ways damaging to one another. However, through comprehensive review of literature, several linkages were identified to serve as the conceptual glue for the juxtaposition of these two realms of investigation. This project, from its initiation, sought to improve the student experience within the university campus environment. In order to accomplish this goal, a visionary plan had to be established and undertaken. To imagine a future in which the university campus is reclaimed for the human and affords a mentally and physically healing experience to users initially appeared to be a daunting task, however, by considering the principles of active and restorative spaces separately initially the problems and solutions were outlined clearly.

The Kansas State University campus currently acts primarily as a spatial container which affords a moderate level circulation opportunities to its students, faculty, staff, and surrounding community. This design proposal re-imagines the function of the typical campus street and insists that the streetscape can be transformed to provide a much more physically and mentally healthy environment. Currently, walking or bicycling across or along campus streets requires the directed attention of users as several modes of transportation share the

same space, inherently creating many of the conflicts described in the previous chapter. At the campus level, the proposal essentially “sorts” the various modes of travel into their own defined spaces to reduce conflict and promote student selection of active transportation as a mode of travel to and from the campus. As students mental and physical health continues to deteriorate, the author began to imagine that the act of movement through the campus could become a mentally restorative experience for students undergoing many academic and personal stresses. The act of walking and bicycling as a form of physical activity has been meticulously programmed into the campus environment to maximize users’ interaction with the restorative benefits of nature. Separated bicycle and pedestrian routes wind and weave through natural settings, allowing students to engage with a calm, natural setting rather than the current chaotic environment.

A linear “garden street” is created to unite the campus core and connect several underutilized outdoor spaces on campus. This slow movement, strolling space allows students to truly enjoy the journey to class and other campus destinations. The physical and mental health of the student body of Kansas State University is promoted by reducing students’ dependence on directed attention during their active movement throughout the campus. Overall, by shaping opportunities for movement and interaction with restorative landscapes, students’ mental and physical health can be improved while improving the campus image.

Figure 6.2 (Facing Page) Conceptual Campus Wide Plan | By Author





# CAMPUS SCALE DESIGN

## DESIGN INTENT

Decisions and recommendations made at the campus scale are based primarily on promotion of active transportation. Improvements to current pedestrian and bicyclist infrastructure are undertaken to encourage greater participation by users. By applying the two considerations (Figure 6.3) of campus scale design within the active transportation framework identified in Chapter 4, a series of interdependent systems is distributed through Kansas State University's campus. These systems create increased affordances related to promotion of bicycling and walking and work together to promote the physical health of the student body. Conflict resolution between modes of travel is a key consideration of design solutions proposed at the campus scale. The broad strokes at this scale of planning and design are further refined and programmed in the corridor and site design scales later in the chapter.

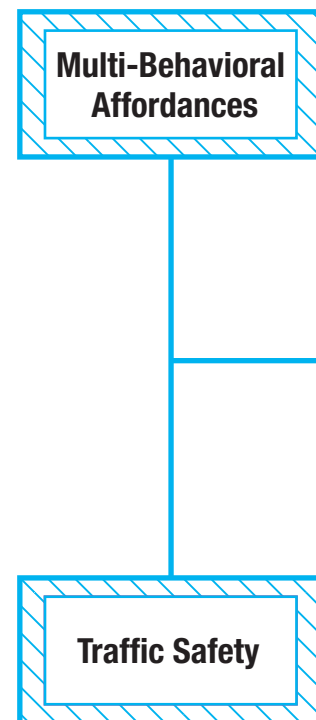
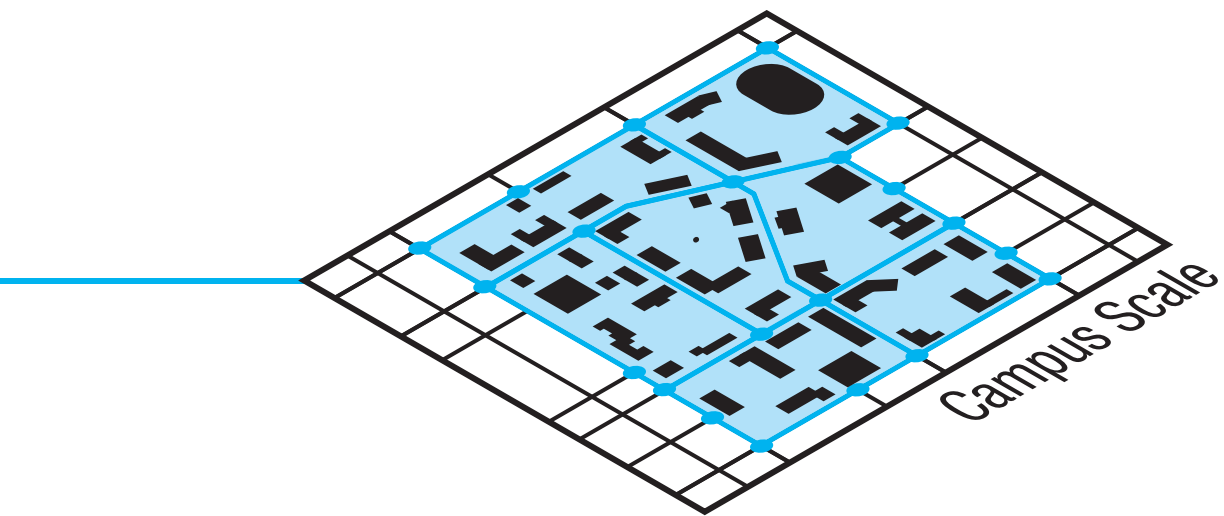


Figure 6.3 Campus Scale Design | By Author



## **PARKING REMOVAL & CONSOLIDATION**

Parking supply and demand has been an issue within Kansas State University for years (Swanson, 2015). Reduction of parking within the campus can encourage students to make the switch from driving to active transportation, however, as the university grows one must consider the needs of a growing student body. Therefore, to be realistic, parking scheduled for removal should be consolidated elsewhere on campus. Several surface parking lots identified on the facing page in Figure 6.3 within the campus core were identified through student survey as sources of stress and anxiety. Beyond their provision of environmental stress, these surface lots severely limit the amount of interaction with the restorative benefits of nature. Consequently, these surface parking lots are removed and consolidated into structured parking directly North of the Derby student residential complex.

Figure 6.4 *(Facing Page)* Parking Removal & Consolidation | By Author





## **BUILDING INFILL**

Once surface parking within the campus core is consolidated within a large parking structure identified on the previous spread, several opportunities for academic building infill emerge within the former parking lots. The 2012 Kansas State University master plan was referenced to site new buildings to provide increased academic opportunities as the university seeks to become a top research institution by 2025. An expansion to the Chemistry/Bio-Chemistry complex replaces the entire footprint of one parking lot. Within the former bounds of the large, triangular parking lot at the junction of Claflin Road and Mid-Campus Drive, four new academic buildings have been sited. By focusing future campus development within the campus core, students maintain access to nearly their class by foot or bicycle. This also provides a unique opportunity to redevelop the open space upon which the buildings sit.

## **INCREASED DENSITY & SPATIAL DEFINITION**

The increased density which results from siting more buildings within the campus core allows for more potential interaction between students, faculty, and staff through the day. Through the literature review, the correlation between density and walkability was also established, further rationalizing this decision. Moreover, by increasing the density of the campus core, the spatial character of the campus and resulting human experience will surely change. Within the Mid-Campus Drive corridor, the new building infill shapes a more introspective and defined space that is suitable for development of a restorative landscape. The increased spatial definition shapes an interesting linear quadrangle environment that provides a great deal of flexibility to users circulating through and inhabiting the space. By creating a higher degree of density, the campus will hold an elevated degree of spatial richness.

Figure 6.5 *(Facing Page)* Building Infill Creates Higher Density | By Author



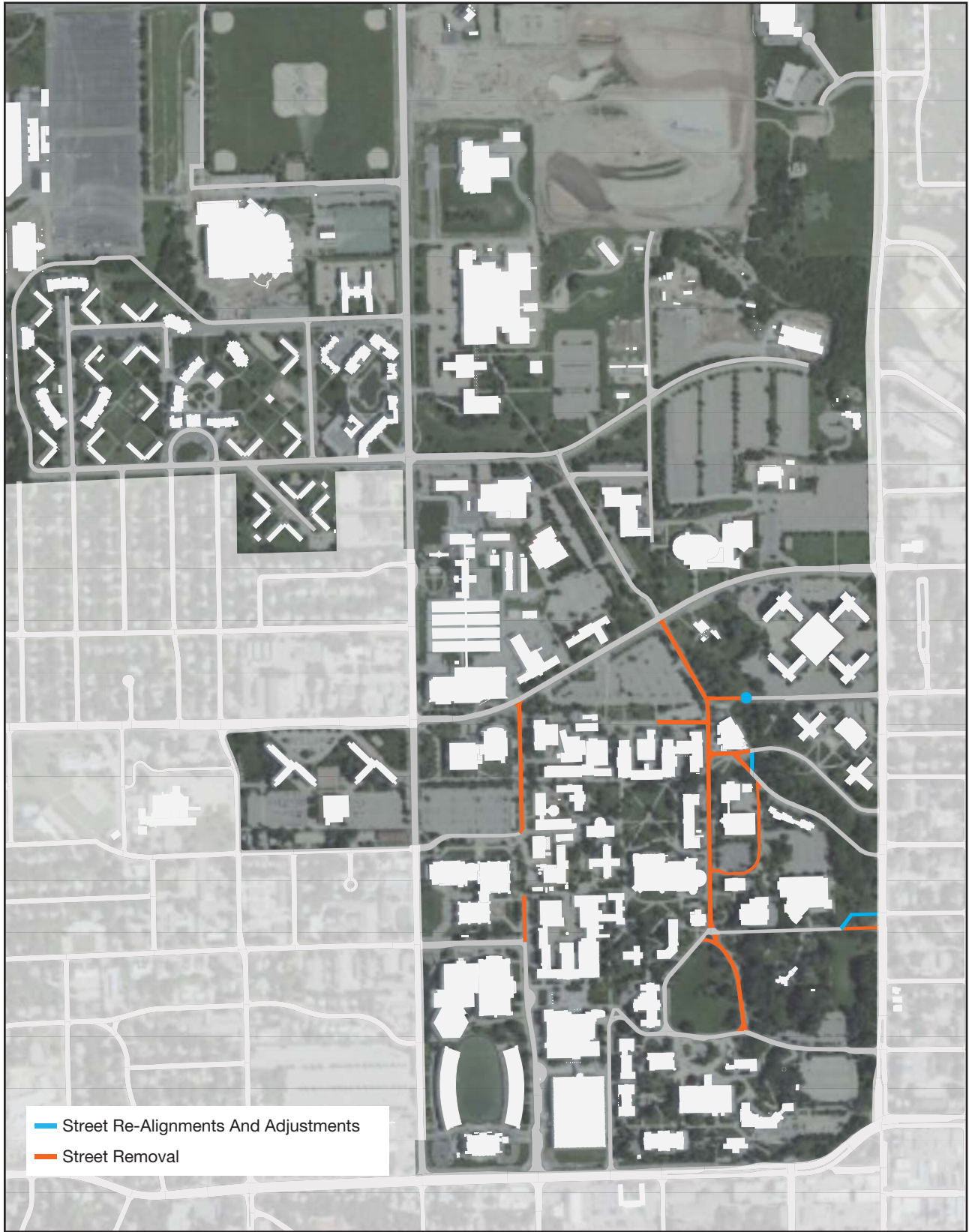
## STREET CLOSURES

Closure of several streets to daily vehicular traffic is a primary campus level design decision in order to create a larger pedestrian zone within the Kansas State University campus. Figure 6.5 on the facing page identifies these street closures within the greater campus context. Mid-Campus Drive was identified through site analysis as a primary candidate for closure and is closed from its intersection with Lovers Lane to Claflin Road. This corridor, dense with academic buildings, can be reclaimed as a nexus for student life, walking, and interaction with nature. Several minor streets adjacent to Mid-Campus Drive have been proposed for closure as well as they no longer provide access to parking or building entrances. 17th Street, on the West side of the campus core, is also scheduled for removal as it provides very little functionality for vehicles and holds a high degree of potential as a future North/South bicycle route.

## STREET RE-ALIGNMENT & CHANGES

Several street re-alignments have been proposed to simplify and clarify modified vehicular and pedestrian/cyclist circulation routes. Lovers Lane has been aligned with Thurston Street on the East side of campus to clarify pedestrian and bicycle access across a currently confusing junction. The re-alignment responds to student survey data identifying this intersection as a stress and anxiety inducing space. While Old Claflin Road previously connected with Mid-Campus Drive, a drop-off roundabout has been proposed for installation as Mid-Campus Drive will no longer exist as a carrier of normal automobile traffic. This drop off will significantly reduce the street noise and modal conflict that exists within the Mid-Campus Drive corridor. Lastly, the intersection of Petticoat Lane and Campus Creek Road has been simplified to allow transit access and claim space for corridor and site scale design.

Figure 6.6 (Facing Page) Street Closures & Re-Alignments | By Author





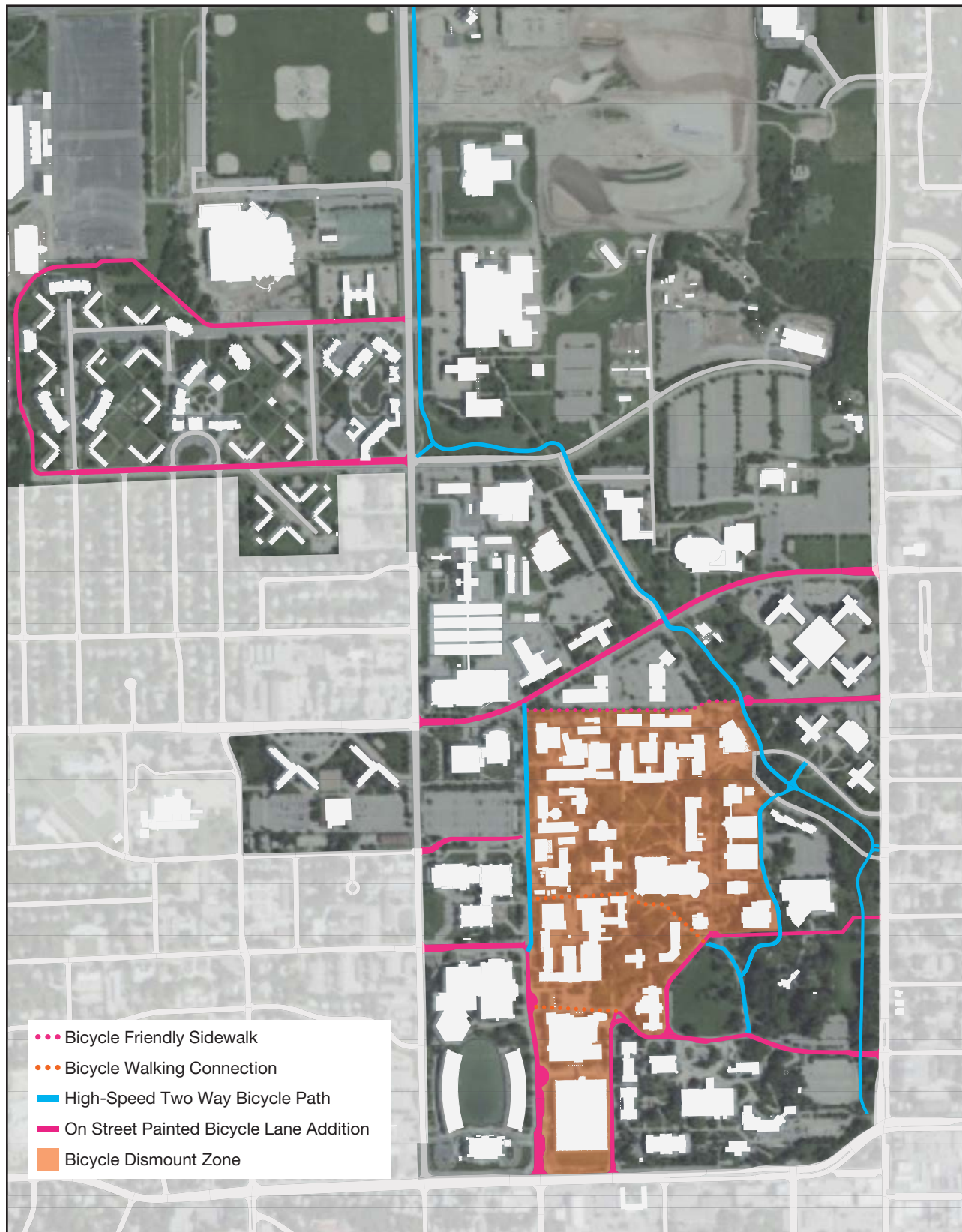
## TRAVEL MODES CONFLICT MITIGATION

As previously discussed, conflict between bicyclists, pedestrians, and vehicles were identified as a deterrent to participation in active transportation behaviors through the author's survey. To reduce these conflicts and provide a more coherent means of traveling through the campus, two different types of bicycle infrastructure are proposed for addition within the Kasnsas State University campus. The first type of infrastructure, a system of separated two way bicycle paths acts as a bicycle highway within the campus to allow fast movement between the future campus growth to the north including NBAF and the southern campus core and adjacent cultural district, Aggieville. A series of "feeder" bicycle lanes are defined through a systematical street dieting process on nearly all campus streets. These bicycle lanes are intended primarily to afford students the ability for increased mobility within the campus boundary. The bicycle lane additions within Claflin Road allow increased

mobility for individuals to travel East-West across campus and connect the main student dormitory complexes, two of the most dense areas of the campus/city. The creation of two different types of bicycle infrastructure allows users of varying skill levels and confidence to feel comfortable and safe as they move through the campus environment. By allocating space specifically for bicycles within the streets, vehicles will respect bicyclists' space to a higher degree. While a dismount zone currently exists within the campus, it is poorly delineated by painted symbols on sidewalks which have faded quickly through time. The dismount zone must be identified through clear vertical signage adjacent to paths and regulated by campus police to limit conflicts between pedestrians and bicyclists within the bust campus core. Figure 6.7 on the facing page illustrates the proposed infrastructural additions and changes at the campus scale in order to separate the currently conflicting modes of travel.



Figure 6.7 (Facing Page) Proposed Bicycle Infrastructure | By Author



## SEPARATION OF TRAVEL MODES & USERS

The primary separated bicycle path identified on the previous page in Figure 6.7 reclaims underutilized open space directly adjacent to Campus Creek and the East boundary of the campus. To provide a safer experience for students bicycling through and within campus, this route minimizes adjacency and intersection with pedestrian and vehicular routes within the campus. The development of this the separated bicycle paths also provides an opportunity to explore structural, ecologically functional, and aesthetically pleasing improvements to the currently degraded riparian corridor along campus creek. In its current form, Campus Creek is not an amenity to students at Kansas State University, however, the greenway along the creek's course provides an engaging setting for development of this bidirectional bicycle path. As discovered through the literature review, by participating in physical activity within a natural setting, the mental health benefits of interaction

with nature and physical health benefits related to increased physical activity are compounded. Participation in physical activity through bicycling within a naturalized setting on these separated bicycle paths therefore affords students many new opportunities for promotion of mental and physical health. The bidirectional path allows travel in both directions and has been scaled appropriate to bicycle lane design standards in order to allow users to safely pass other bicyclists without interfering with oncoming traffic. Each lane is six feet wide with a six inch buffer along the edges and center for striping purposes. In grade crosswalk buttons at intersections with on campus vehicular routes allow give bicyclists the same right of way as pedestrians at all mid-block crossings and trigger lights warning vehicles to yield to bicyclists within the campus. Stop and yield signs at all intersections with pedestrian routes inform bicyclists of the pedestrians' right of way and further reduce conflict.



Figure 6.8 (Facing Page | Top) Existing Lack of Restorative & Active Affordances | By Author

Figure 6.9 (Facing Page | Bottom) Proposed Separated Bicycle Lane And Riparian Corridor Improvements | By Author







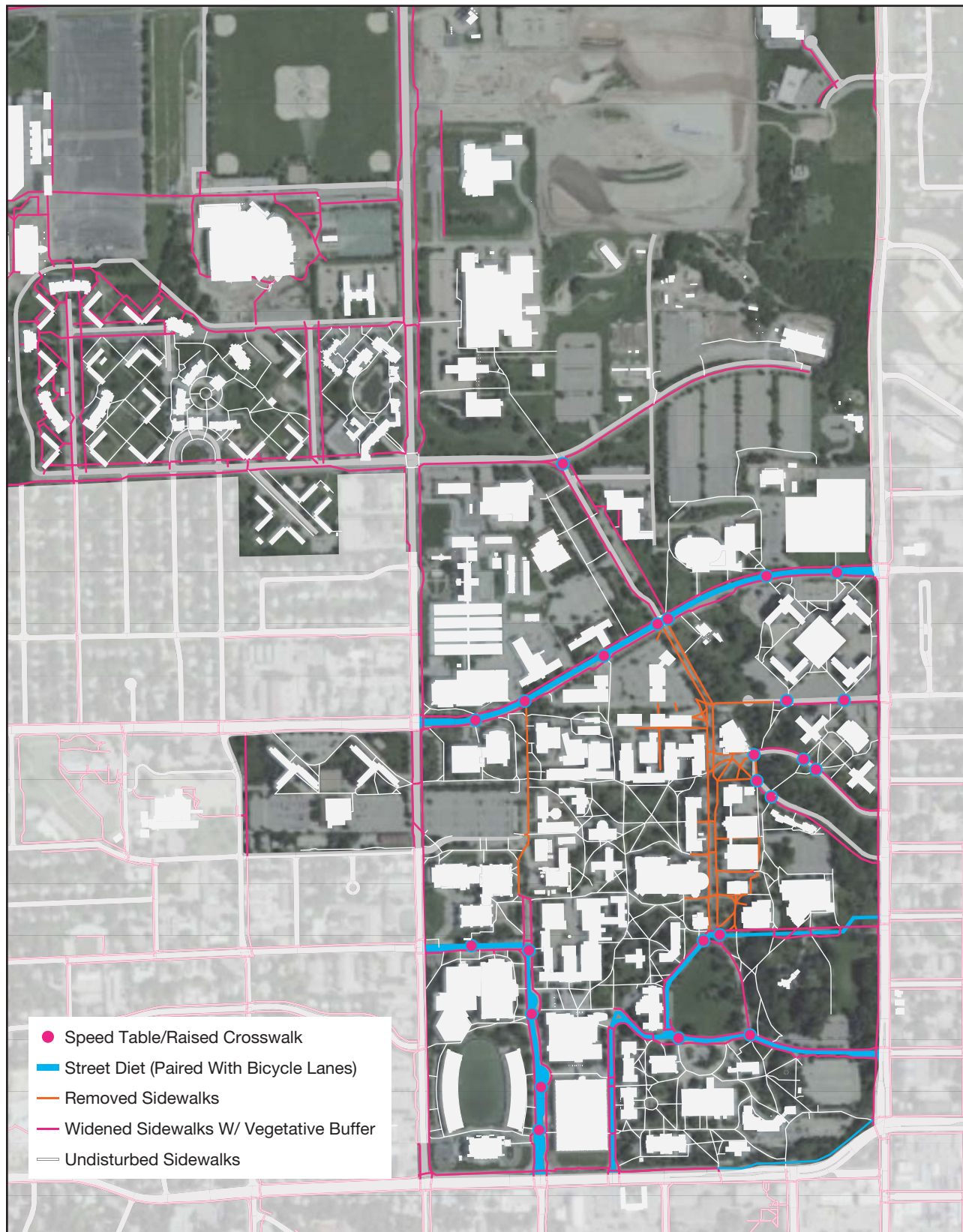
## IMPROVED PEDESTRIAN INFRASTRUCTURE

While the site analysis of Kansas State University's campus identified that the current network of pedestrian infrastructure in the form of sidewalks is well established, it was clear that the experience of movement along these sidewalks could be substantially improved. Junctions between sidewalks and streets within the campus lead to confusion at times when drivers are not aware of the pedestrian right of way within the campus bounds. Long crossing distances associated with pedestrian discomfort at many of the campus' intersections can be improved through street dieting and redistribution of space. Since many of the vehicular circulation routes within the campus are required for service, emergency, and various access functions, a campus scale design solution must maintain vehicular access while shaping a safer pedestrian experience. There are many opportunities for street dieting within the campus as the safety of a street, contrary to popular belief, does not increase as its width increases past 11

feet per travel lane. For instance, Claflin Road has 15 foot wide travel lanes that are shared between bicyclists and vehicles. By reducing the size of travel lane to 11 feet, additional space is reclaimed and transformed into bicycle lanes to allow more comfortable and safe active transportation options for students. This inherently creates a spatial buffer between vehicles and pedestrians. To further improve the pedestrian experience, sidewalks which lie adjacent to or intersect with vehicular streets are set back three feet further from the dieted street. This expanded space is then planted with aesthetically pleasing, low maintenance native grasses that maintain a high degree of visibility between pedestrians and vehicles for safety purposes while defining a specific pedestrian space. Lastly, speed tables that act as raised crosswalks are envisioned at all major intersections of pedestrian and vehicle circulation to increase the sense of pedestrian ownership of the crosswalk space, increasing safety.



Figure 6.10 (Facing Page) Street Diet And Related Pedestrian Improvements | By Author



**CURRENT TYPICAL CAMPUS STREET**  
*(CLAFLIN ROAD AS CASE)*

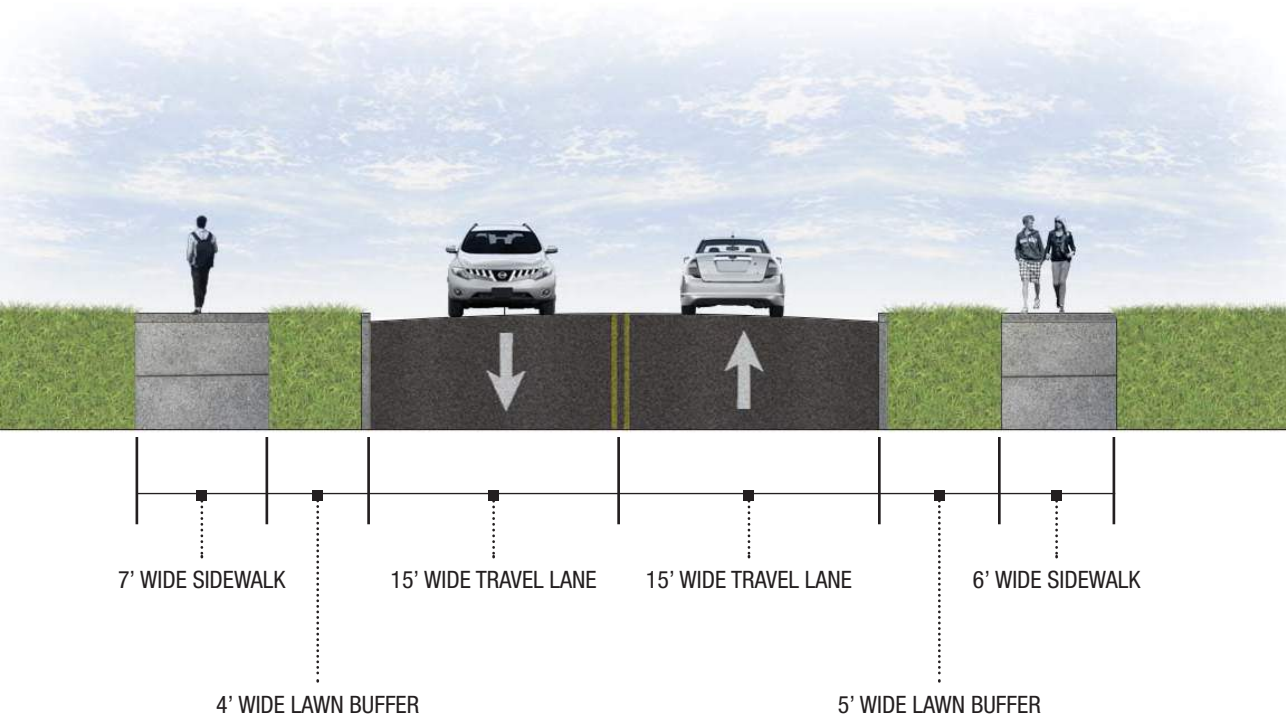
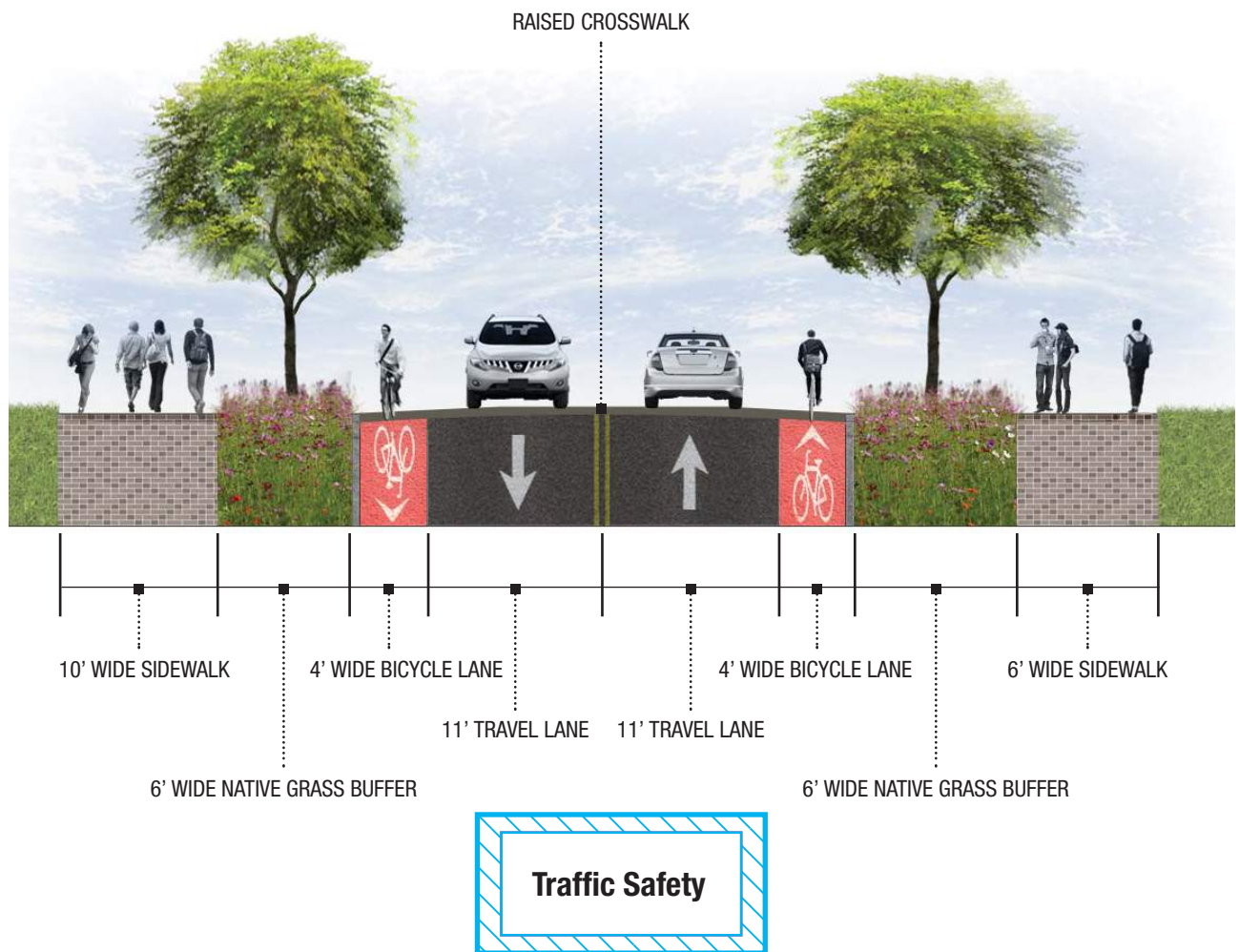


Figure 6.11 (Facing Page | Top) Current Site Conditions At Claflin Road | By Author  
Figure 6.12 (Facing Page | Bottom) Proposed Street Diet | By Author

**PROPOSED CAMPUS STREET DIET  
(CLAFLIN ROAD AS CASE)**





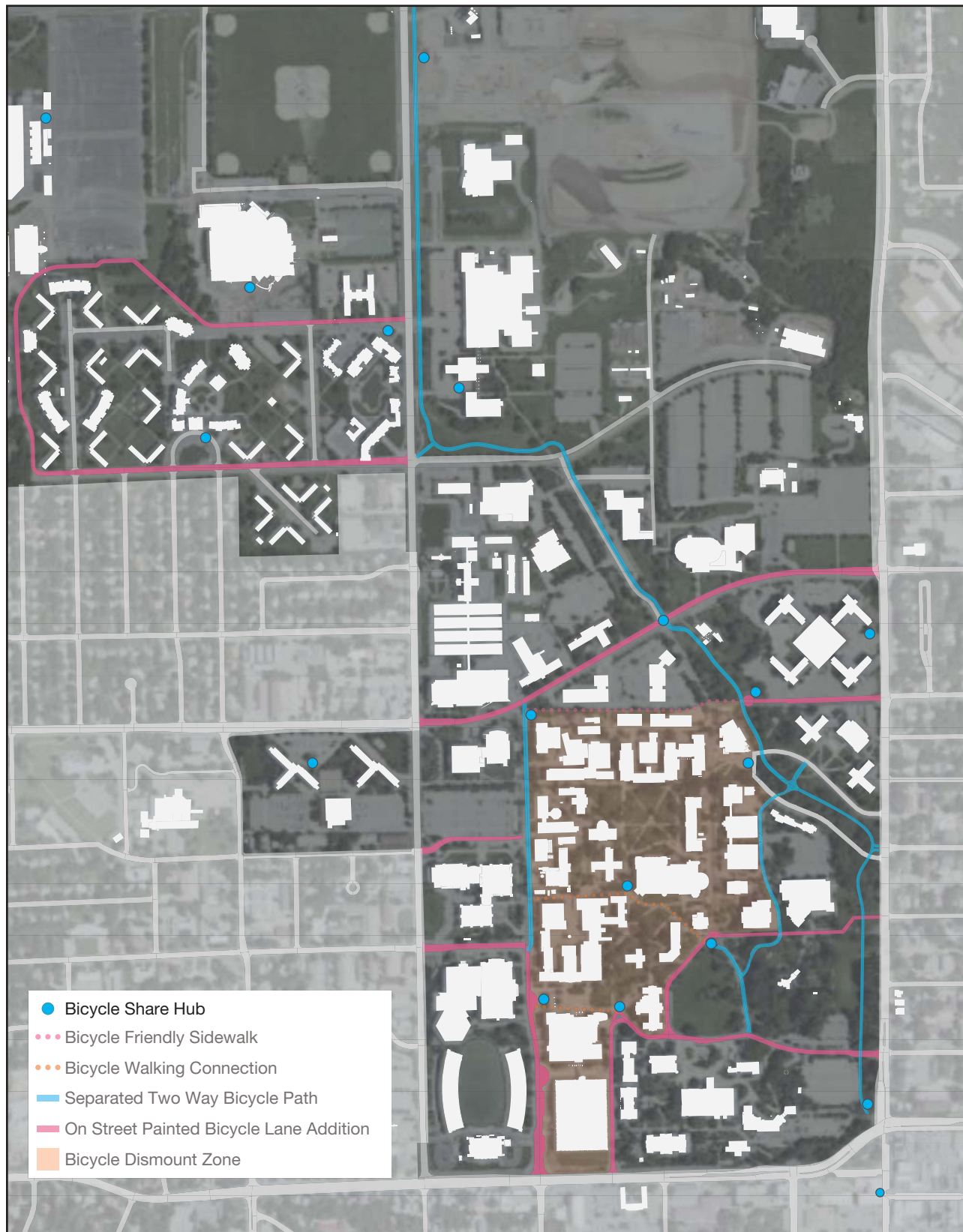
## CAMPUS WIDE BICYCLE SHARE SYSTEM

A moderate amount of students identified within the author's survey that a bicycle share system would encourage them to bicycle to campus and class more often. Since the main campus is well defined within the urban fabric of Manhattan, this bicycle share system can serve both the university and surrounding community. A bicycle share system based on the previously discussed concept of a "smart" bicycle with "dumb" hubs has been determined as most appropriate for inclusion within the campus. By pairing with a national service provider with significant experience in the field such as Social Bicycles, the project coordination and resulting financial risk can be reduced. Each individual bike is outfitted with a computer and GPS system that allows students to reserve bicycle in person, via mobile phone, or through the internet. The service will operate on a subscription based model where students can purchase a daily, weekly, monthly, or semester long pass to receive access. Monetary rewards

and incentives are used to encourage students to return the "smart" bicycles to the hubs which allow exclusive parking of the bicycle in several convenient locations around campus. This system allows the highest degree of flexibility to students by placing all rental hardware and software within the bicycles. These locations have been selected based on their proximity to the most frequented campus buildings, bicycle infrastructure, and campus transit service stops discussed on the following page. This service will begin primarily as a service to allow inter-campus movement, but based on its popularity future exploration into community wide service and hubs may be explored. A student would be able to take a bus/walk to campus and rent a bicycle to use for the day at several key transit nodes. Based on its proximity to campus and high availability of commercial, cultural, and dining functions, Aggieville will contain a hub that allows students to bicycle on and off campus for a mid-day break.



Figure 6.13 (Facing Page) Potential Bicycle Share Hub Locations | By Author



0 500 1,000 2,000 Feet



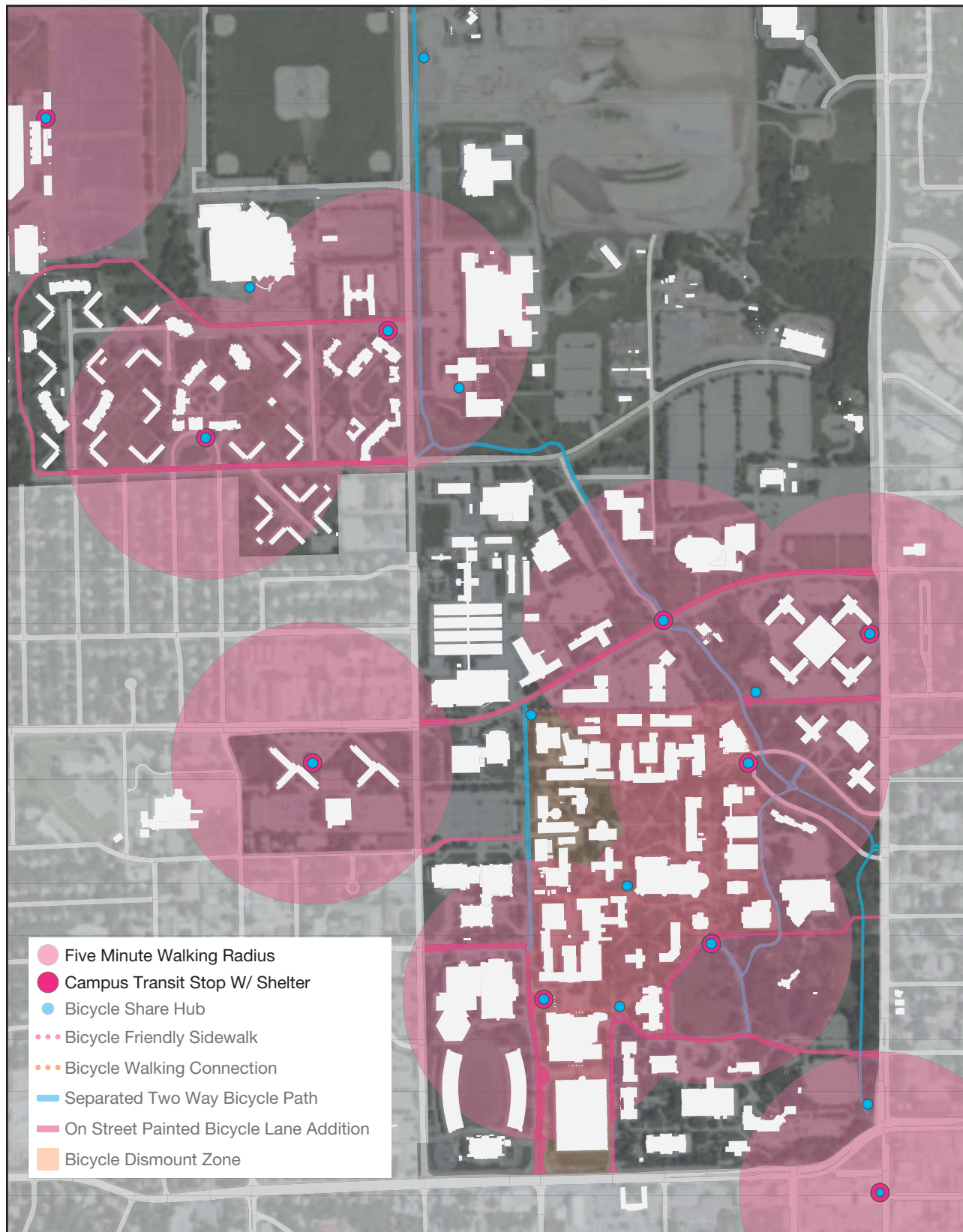
## MULTI-MODAL TRANSIT SYSTEM

Another strategy identified to reduce both the need for parking on campus as well as the conflict between vehicles and pedestrians/bicyclists is the creation of a more formalized campus transit service. The university currently has a park & ride service with very limited ridership and visibility to students. However, this service can be significantly upgraded by providing structured transit stops to increase visibility and protect users from the elements. A limited amount of routes and transit stops within the campus currently reduces the convenience of this system for students. As shown in Figure 6.14 on the facing page, by adding more transit stops within the core campus, the functionality of the system can be significantly improved. Transit stops were sited based on their proximity to the most frequented buildings on campus and access to bicycle and sidewalk networks. By providing convenient park and ride access to the football stadium on the far North boundary

of the campus, students, faculty, and staff who commute to campus will have increased parking options. This additionally reduces the amount of parking spaces required within the campus core, freeing up more area for functional spaces. All buses used to shuttle students within this transit system must be outfitted with bicycle racks so that students have increased potential to pair active transportation choices with their use of the transit service. By siting bicycle share hubs at each transit stop, students' mobility is maximized and the potential for physical activity once on campus is increased. These multi-modal transit nodes will create increased opportunities for social activity as a major nexus of circulation types within the campus. These considerations for campus activity and interaction become increasingly relevant during exploration into corridor scale design.



Figure 6.14 (Facing Page) Multi-Modal Transit System | By Author



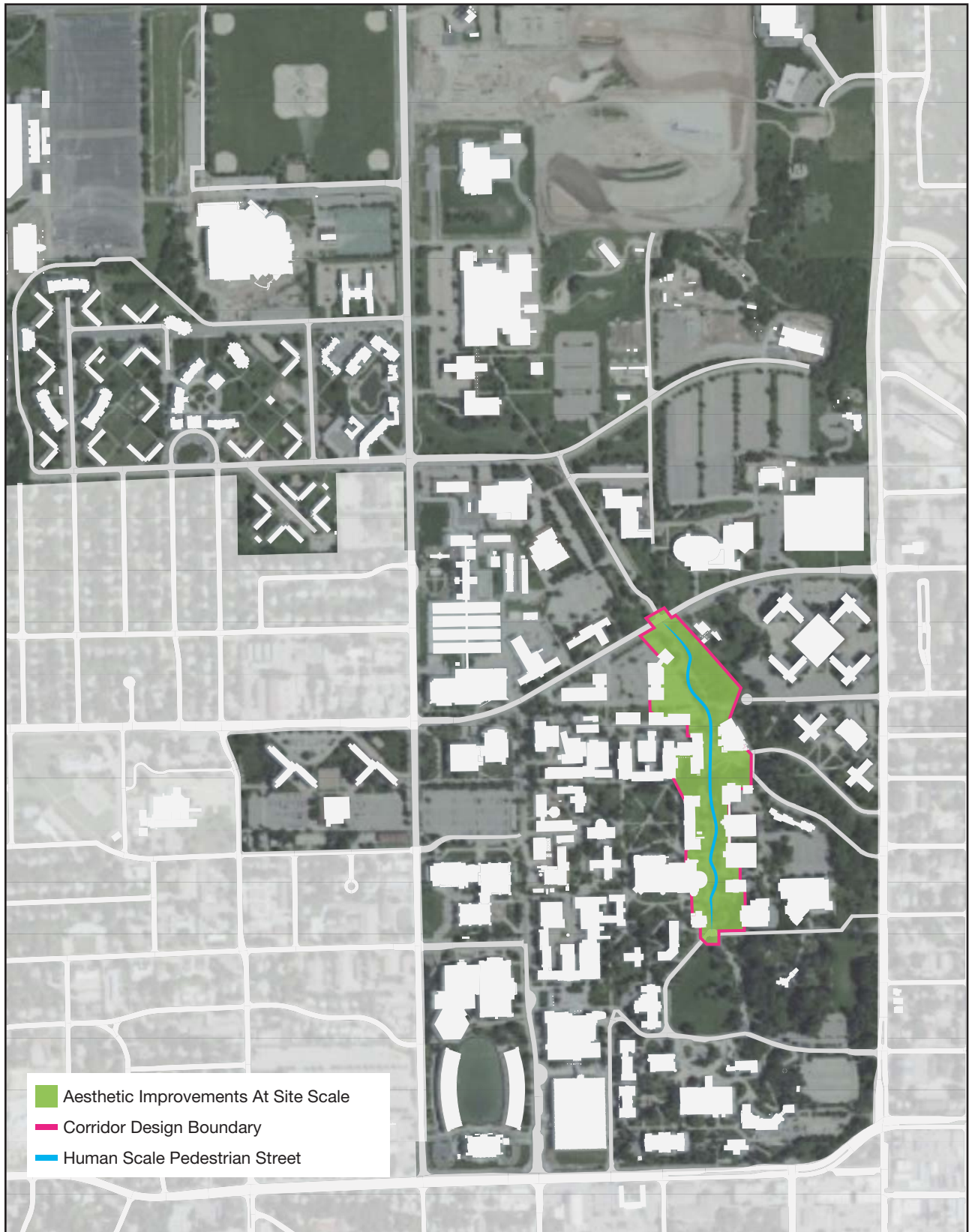


## **SLOW MOVEMENT ZONE**

Definition of the boundary of corridor scale design considerations marks the conclusion of the campus scale design consideration. Site analysis discussed in the previous chapter informed selection of this corridor. As a dense, linear connective tissue within the overall campus, Mid-Campus Drive is defined and designed as an active and restorative “Garden Street.” To increase the safety of pedestrians within this corridor the space is transformed into a calm movement zone that facilitates connection to the restorative benefits of nature as students move between classes and seek out spaces to gather, study, and engage in a variety of activities with their peers. As campus growth expands to the North, this corridor will act as a key campus amenity that provides a powerful sense of place. Detailed consideration into the experience of students as they move through the sequence of outdoor spaces on the campus informs the programming and tactile design of this space.



Figure 6.15 (Facing Page) Corridor Scale Design Boundary | By Author



- Aesthetic Improvements At Site Scale
- Corridor Design Boundary
- Human Scale Pedestrian Street



# CORRIDOR SCALE DESIGN

## DESIGN INTENT

Decisions and recommendations made at the corridor scale are based primarily on the definition of functional programming, circulation, and spatial character within the proposed Mid-Campus Garden Street. This scale of design combines the application of framework themes from both restorative landscape and active transportation design to shape a calm pedestrian movement zone in the heart of campus. As active transportation and restorative landscape design inherently require different considerations, design decisions at this scale balance the needs of each through careful consideration into the experience of the corridor at the pedestrian speed of movement. An early decision based on potential modal conflicts and distraction from mental restoration determined that the corridor is most suitable for pedestrian movement. The corridor scale establishes a poetic spatial framework to ensure that more detailed site scale design remains true to an overall vision for the corridor experience.

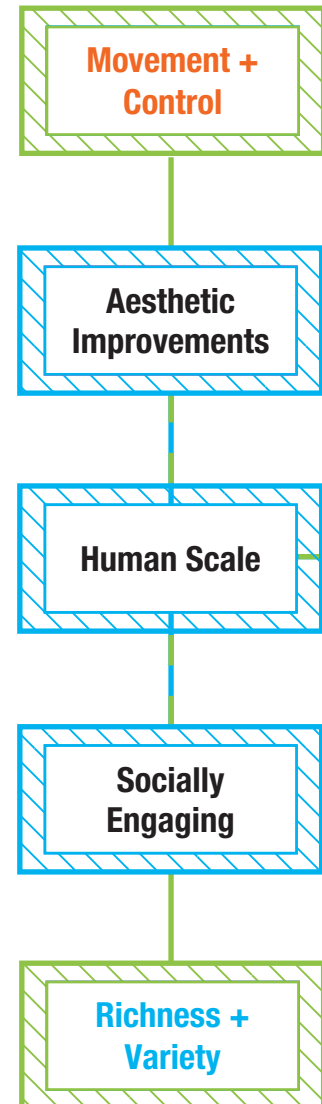
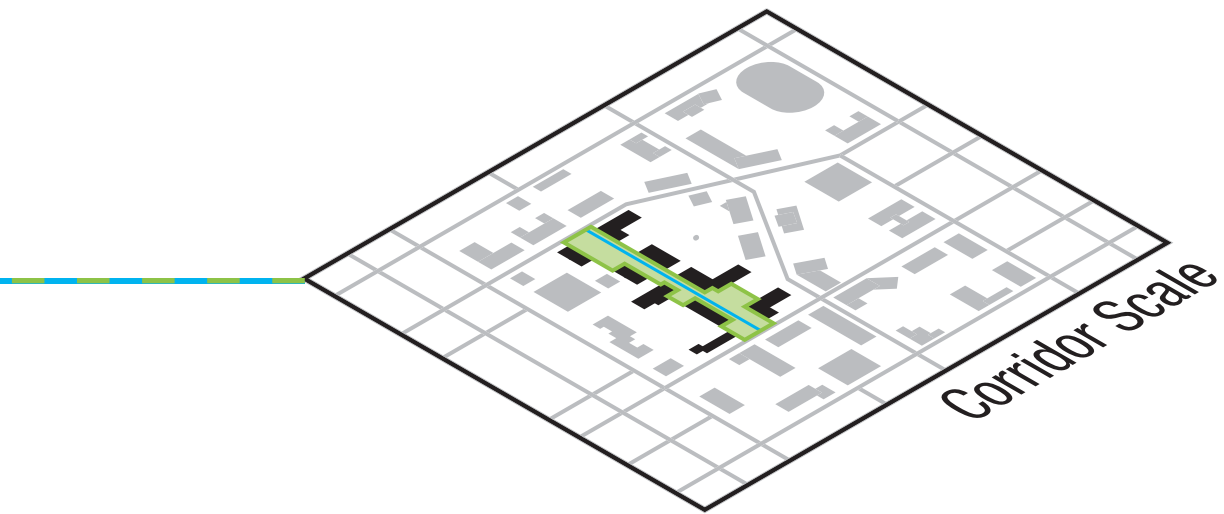


Figure 6.16 Corridor Scale Design | By Author

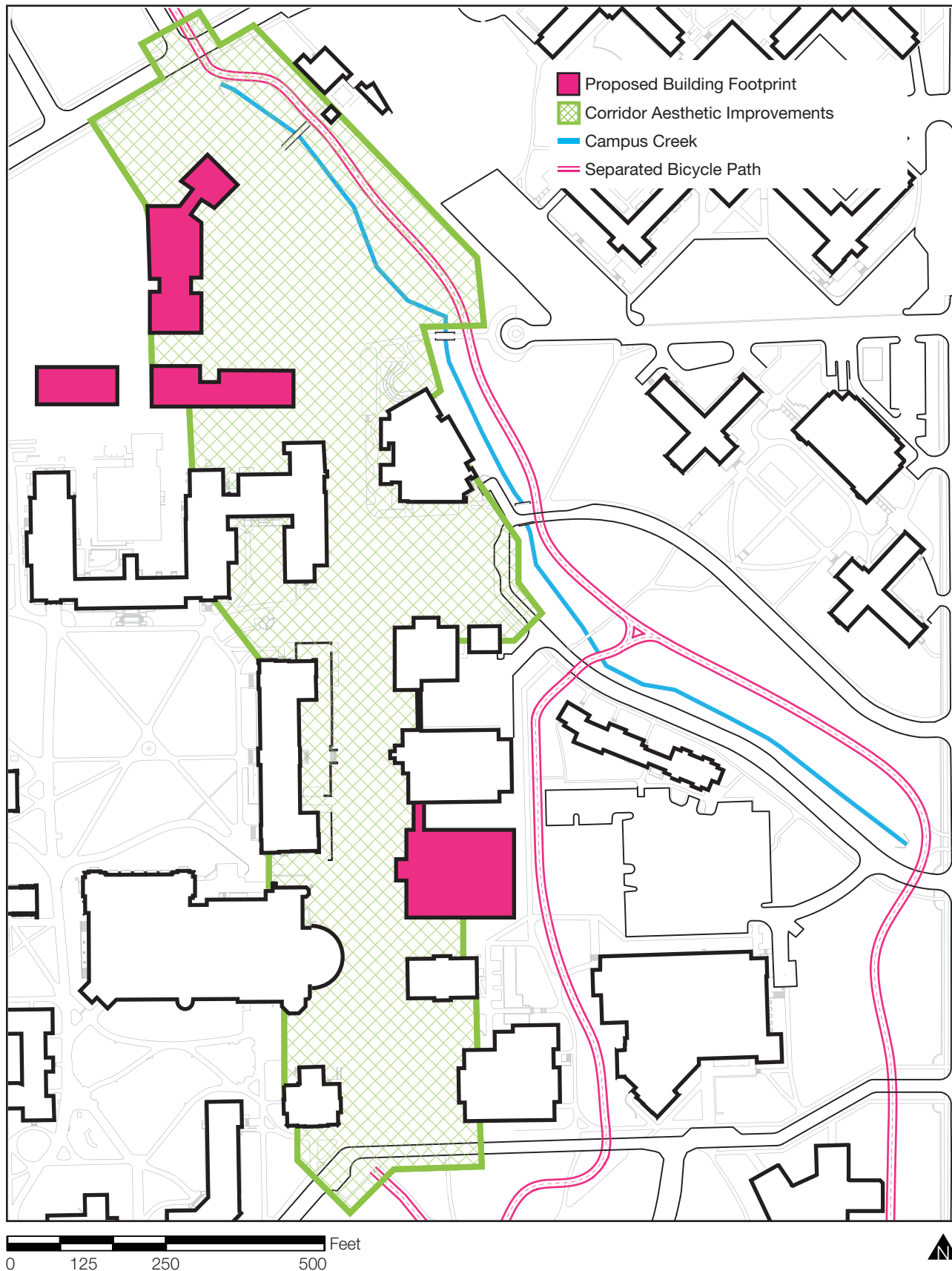




## CORRIDOR SCALE ASSUMPTIONS

In order to create a cohesive, well connected, and evocative environment at the corridor scale, the impact of planning and design decisions made at the campus scale must be fully recognized. Figure 6.17 on the facing page identifies building footprints proposed at the campus scale as well as the pure, unprogrammed space which remains after removal of Mid-Campus Drive and realignment of Old Claflin Road and Campus Creek Drive. What once appeared as a typical uninviting suburban streetscape can now be viewed as a fresh canvas of sorts waiting for meaningful active and restorative spaces to be distributed within it. The space itself, prior to any formal design of programming, is now much more appropriately scaled to the experience of a human. The corridor provides exposure to nature along campus creek as well. Moreover, dramatic changes in spatial enclosure from building massing and topographic relief along this corridor shape a dynamic experience of compression and release.

Figure 6.17 *(Facing Page)* Corridor Scale Design Assumptions | By Author



### NODES OF SOCIAL OPPORTUNITY

Based on corridor scale circulation analysis and supplemental observational study, three primary nodes of social opportunity have been defined and called out in Figure 6.18 on the facing page. These nodes represent key junctions of several modes of transportation as each node has direct access to a separated bicycle lane, transit stop, and a vehicular street for drop off purposes. These adjacencies, paired with each node's intersection with primary pedestrian circulation routes creates a unique scenario in which social activity can evolve naturally. Additionally, these social nodes exist within the three most expansive and outwardly focus zones of the corridor. As major entrances to the actual linear garden street, these functions and character of these social nodes must act as decompression gateways as users enter the corridor. Site scale design must focus on create a zone of transition between these social nodes and the more calm atmosphere of the garden street.

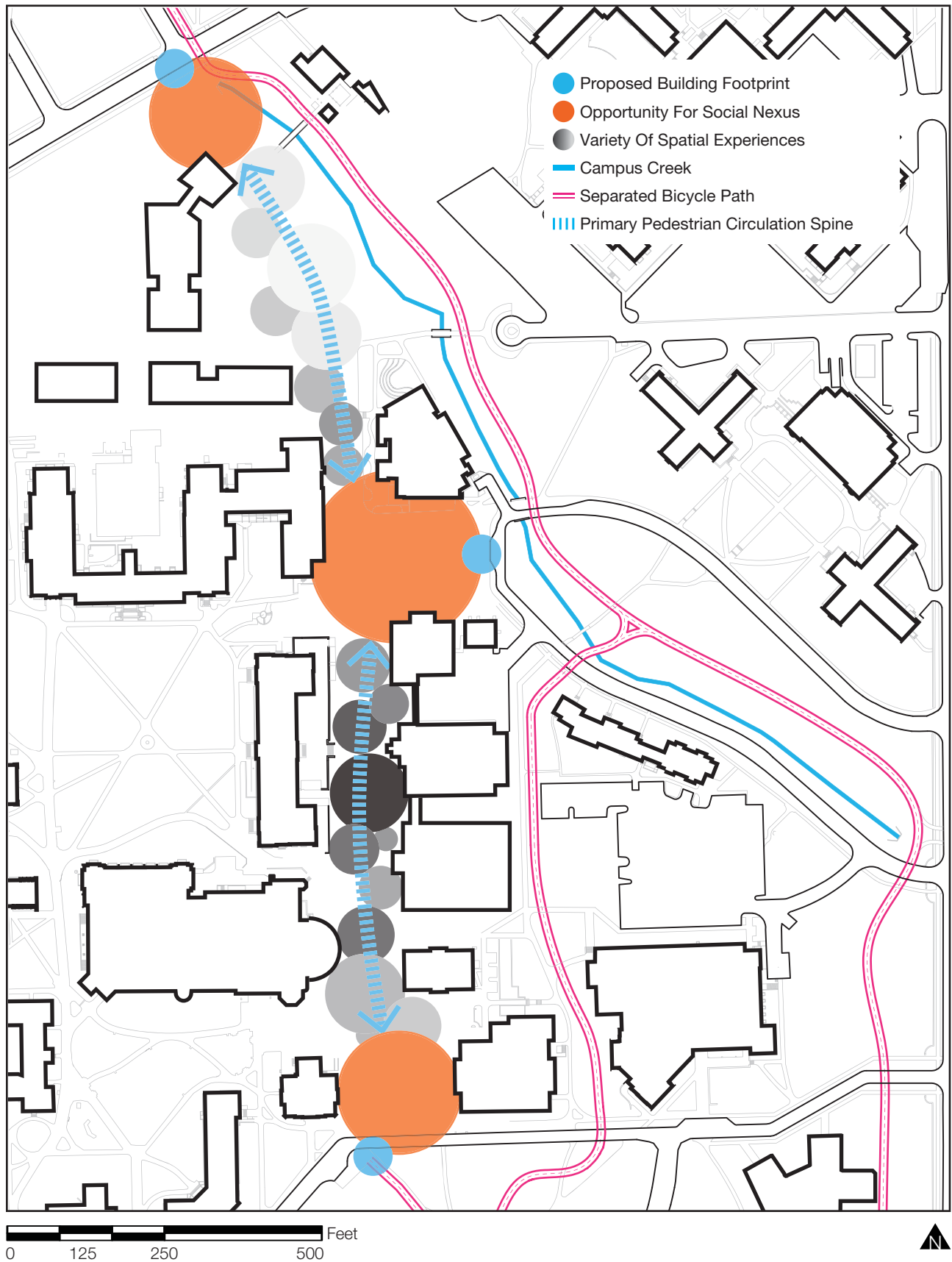


### VARIETY OF EXPERIENCE

When designing a linear space which cannot be comprehended from any singular vantage point, the experience of users as they move through the space at a given pace is a vital consideration. In Figure 6.18 on the facing page, the various colors of gray circles represent the first pass at conceptual spatial programming. They communicate that a diverse collection of spatial characteristics, functions, and types must be present to maintain the interest of a user to both maintain interest to continue strolling through the space and contribute spatial functionality. These collections of bubbles are arranged along one central circulation spine and maintain a relationship with one another based on the transitions from space to space. This spatial variety does not require an entirely different design language to be applied to each individual space. Rather, it describes the importance of creating an experience which naturally unfolds in front of viewers to hold their involuntary attention and provide restoration.



Figure 6.18 (Facing Page) Social Opportunity Nodes & Spatial Diversity | By Author





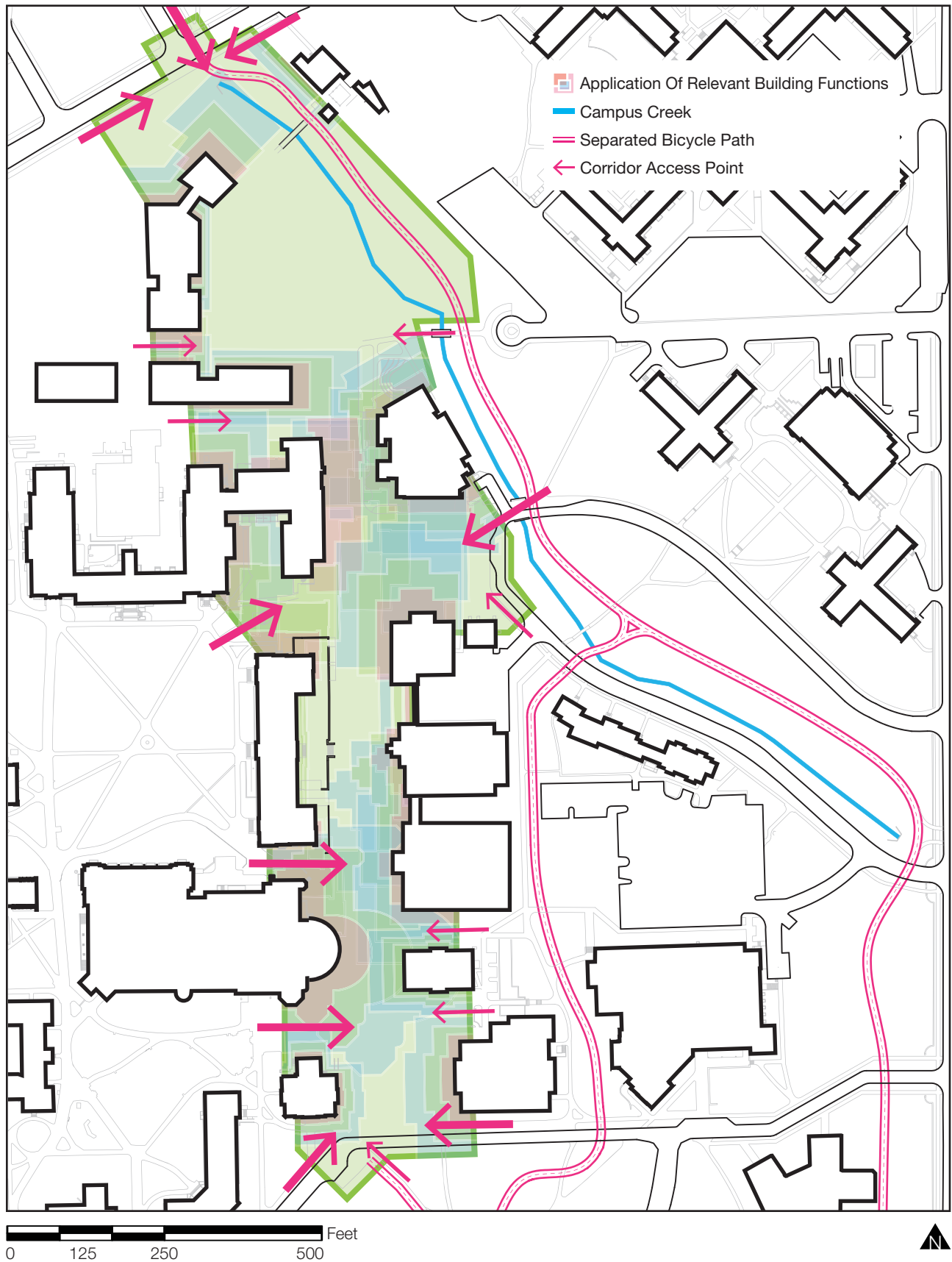
## ARCHITECTURAL CONTEXT

When developing concepts for the spatial programming of the Mid-Campus Drive corridor, the first consideration involved identification of opportunities and constraints related to the existing spatial character of each zone within the corridor. The degree of spatial building masses was the first defining factor in developing a cohesive development strategy for the wide variety of spaces distributed along the corridor. Secondly, the functions and activities of the architectural context was analyzed and synthesized to extract relevant program to blur the lines between architecture and landscape. By allowing the functions of the academic building to spill out into the public streetscape, students can engage with nature in dynamic ways. The last factor in developing a programming strategy was derived from the corridors access points as circulation remains the space's primary function.

## SPATIAL LEGIBILITY AND ACCESS

The Mid-Campus Drive corridor extends through a large area of the core campus of Kansas State University and connects several iconic and underutilized spaces. The southern axis of the corridor terminates onto Anderson Lawn, one of the most picturesque and expansive spaces on the campus. Campus Creek, a currently underused, but potentially engaging campus amenity intersects the northern bounds of the Mid-Campus Drive corridor, providing opportunities to draw design decisions from. The campus' main quadrangle lies directly west of the central zone of the corridor. The two major access points to the quad provide the potential to explore how connectivity between these two segmented campus spaces can be improved. Lastly, the relationships between proposed active transportation improvements including transit stops will define the functions of several spaces.

Figure 6.19 (Facing Page) Key Contextual & Access Relationships | By Author



## EMERGENCY ACCESS

While the project's main driving force involves the closure and conversion of a campus street, infrastructural, operational, and policy based considerations dictate that service and emergency vehicular access must be maintained within the corridor. Service access to the building is not based on any specific rules or regulations and falls within the provisions determined for emergency access. In order to preserve emergency access to the existing and proposed buildings within the corridor, access roads must have a "minimum unobstructed width of 26 feet (7925 mm), exclusive of shoulders, in the immediate vicinity of the building or portion thereof" (ICC, 2012). The International Code Council further specifies that vertical obstructions must be approved by the fire code official prior to construction. These code requirements define many of the preliminary corridor scale circulation design decisions.

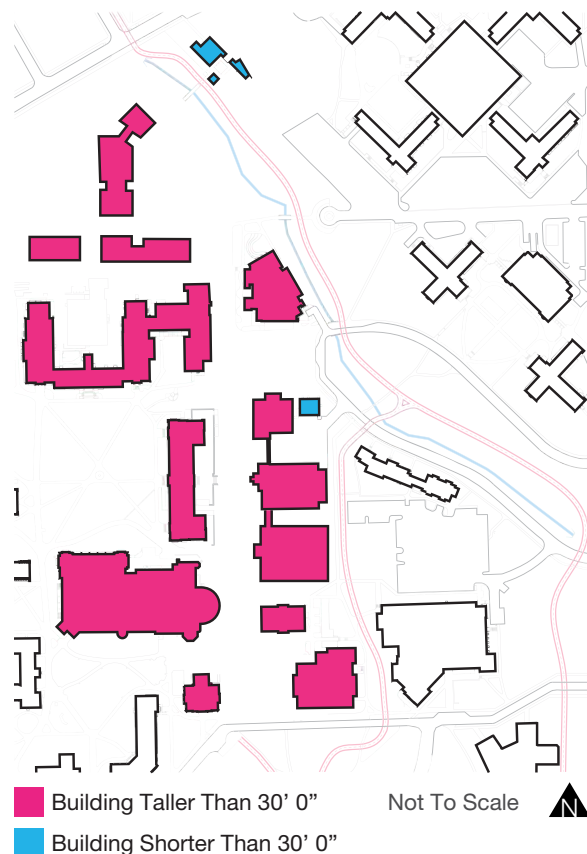
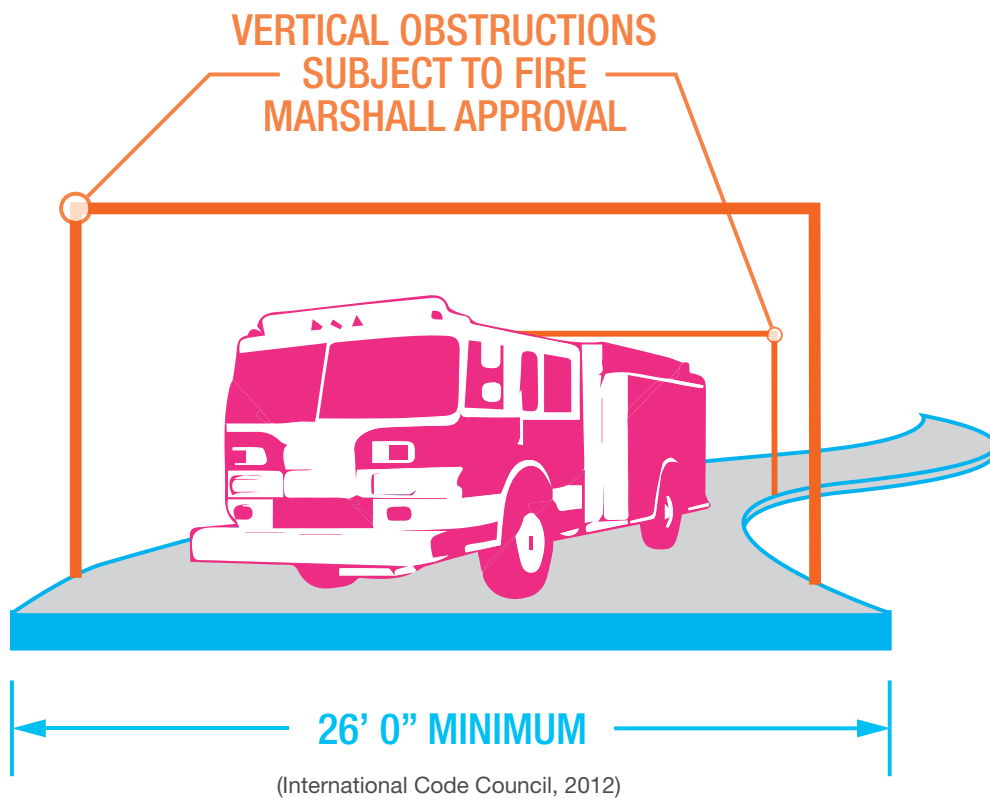


Figure 6.20 (Above) Corridor Building Height | By Author

Figure 6.21 (Facing Page) Emergency Access Considerations | By Author





### CIRCULATION RESOLUTION

As identified on the previous page, emergency access code requirements are a major restriction in the definition of circulation within the corridor. This may be seen as a liability in the development of a design solution, however, through careful path alignment these codes have been transformed into an experiential asset. Definition of a primary pedestrian circulation route to unite the northern and southern bound of the corridor is the first structured design choice. Analysis of the location of all building entries, architectural form/geometry, topographic relief, and corridor access points were all principal matters taken under consideration to determine how the primary circulation would navigate the space. A meandering, organic form fit all of the analysis criteria best of any solution while also providing increased active transportation and restorative landscape contributions.

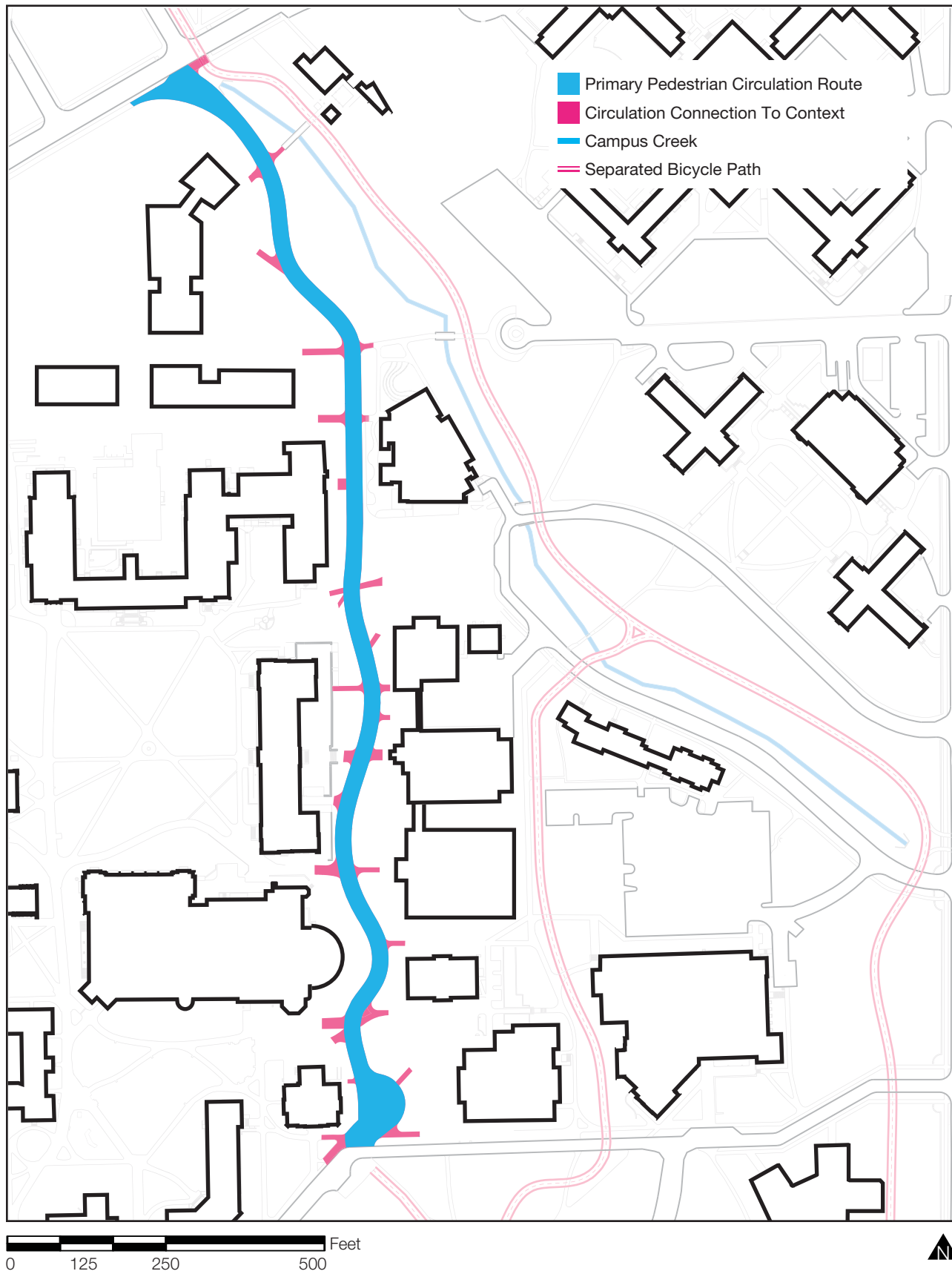


### MEANDERING PATH RATIONALE

A meandering circulation route inherently excites users more than an orthogonal pathway as it provides drama and mystery that engages those within the space and encourages further discovery. By promoting the mysterious richness of spatial intrigue through circulation design, the foundational restorative qualities of the corridor are already set. As meandering and mysterious paths and spaces inherently draw users through them, the design of this primary circulation route may cause students to explore the garden street on foot more often than in its current form. By constantly forcing those moving through the space to reorient themselves to their surroundings, the spatial experience becomes energetic and lively. Active movement through the corridor affords unique opportunities for users to experience the benefits of engaging in physical activity within designed nature.



Figure 6.22 (Facing Page) Circulation Definition & Rationale | By Author



## DIVERSITY OF SPATIAL PROGRAMMING

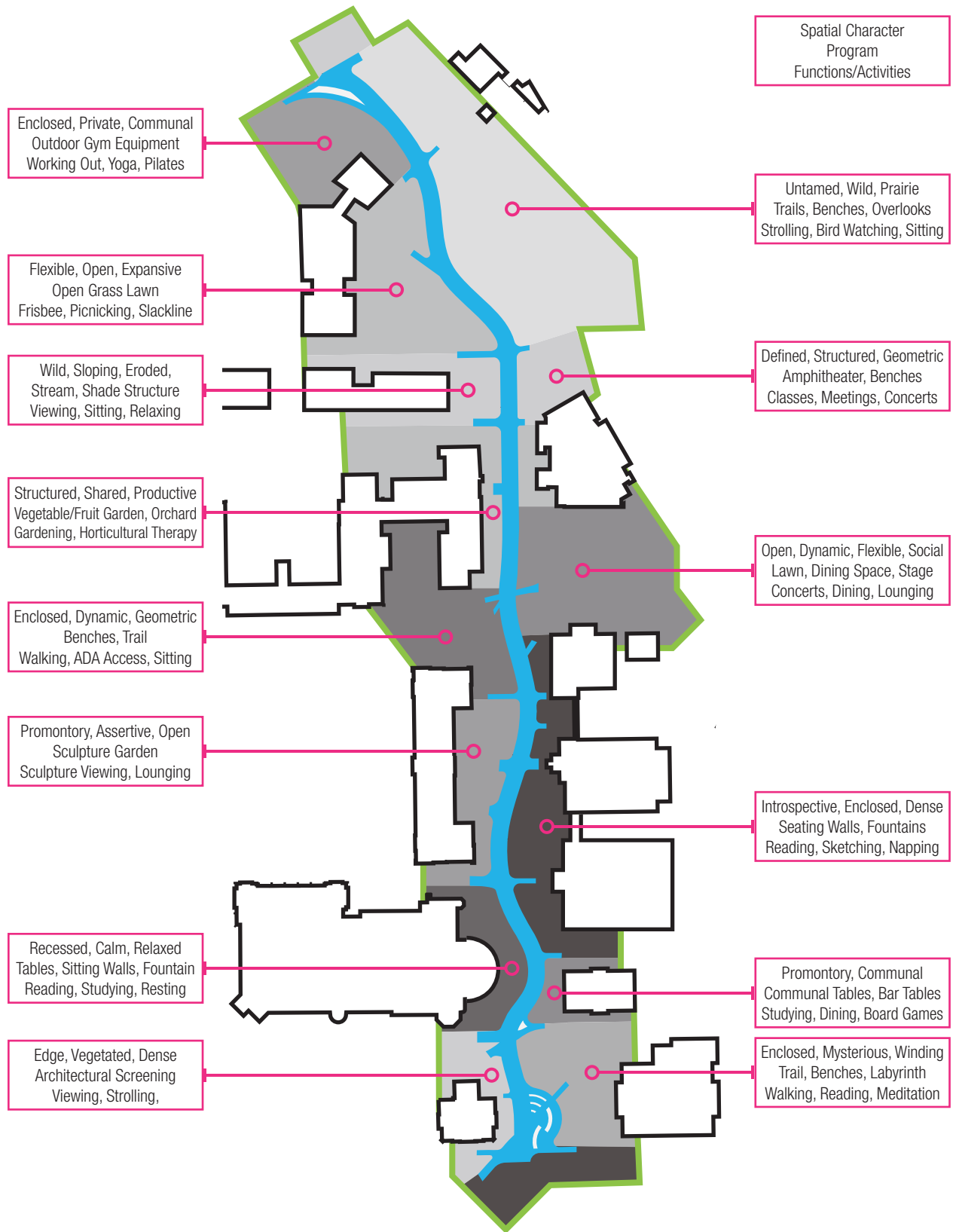
Determination of specific spatial programming requirements was accomplished to provide spatial richness and variety while also maximizing the potential active and restorative functions occurring within the corridor. Three interrelated variables of spatial character, program, and functions/activities describe of each space's relevance and intent within the overall corridor design. Both restorative landscape and spaces designed to promote active transportation benefit from definite programmed uses in order to give users a reason to inhabit or pass through a given space. Figure 6.23 on the opposite page describes the general programmatic characteristics assigned to each spatial zone based on findings extracted from analysis and interpretation. These descriptions provide a brief glimpse into the general factors that guide more refined spatial development initiated within the site scale design component of this project and report.

## HUMAN SCALE SPACES

While variety and richness of spatial programming is imperative to the success of this corridor as nexus of student life, activity, and health, it cannot be completed without careful consideration into the phenomenological relationship between individuals and the spaces they inhabit. Regardless of the function of a space, its scale should respond to the proportions of the human body and foster connection between the users in either an active or passive manner. Focused, deliberate attention towards the artistic use of vegetation, hardscaped surfaces, water features, circulation, overhead planes, and topographic relief can shape a space that evokes meaningful physical and emotional delight. Retractable bollards at the terminating axes of the corridor limit the vehicular access to the space to approved deliveries, drop offs, and emergency vehicles. This, paired with deliberate distribution of enticing visual landmarks further defines an experience scaled to the human form.



Figure 6.23 (Facing Page) Spatial Programming And Activities | By Author





## APPLICATION OF RESTORATIVE SPATIAL ARCHETYPES

The restorative spatial archetypes defined based on synthesis of literature within Chapter 4 of this report allows conceptual and theoretical findings to be translated into a physical manifestations of those restorative principles. The archetypes, briefly re-visited to the right in Figure 6.24 are distributed along the Mid-Campus Drive corridor based on their relevance to the current corridor conditions, spatial character, and programmatic opportunities defined on the previous spread. While the archetypes defined by the author for the purposes of design application represent only a limited spectrum of the near infinite spatial scenarios, they are a powerful tool to develop a systematic understanding of the balance of various restorative principles along the entire corridor. Several spaces in Figure 6.25 on the facing page are multifunctional and exhibit characteristics of multiple spatial archetypes.

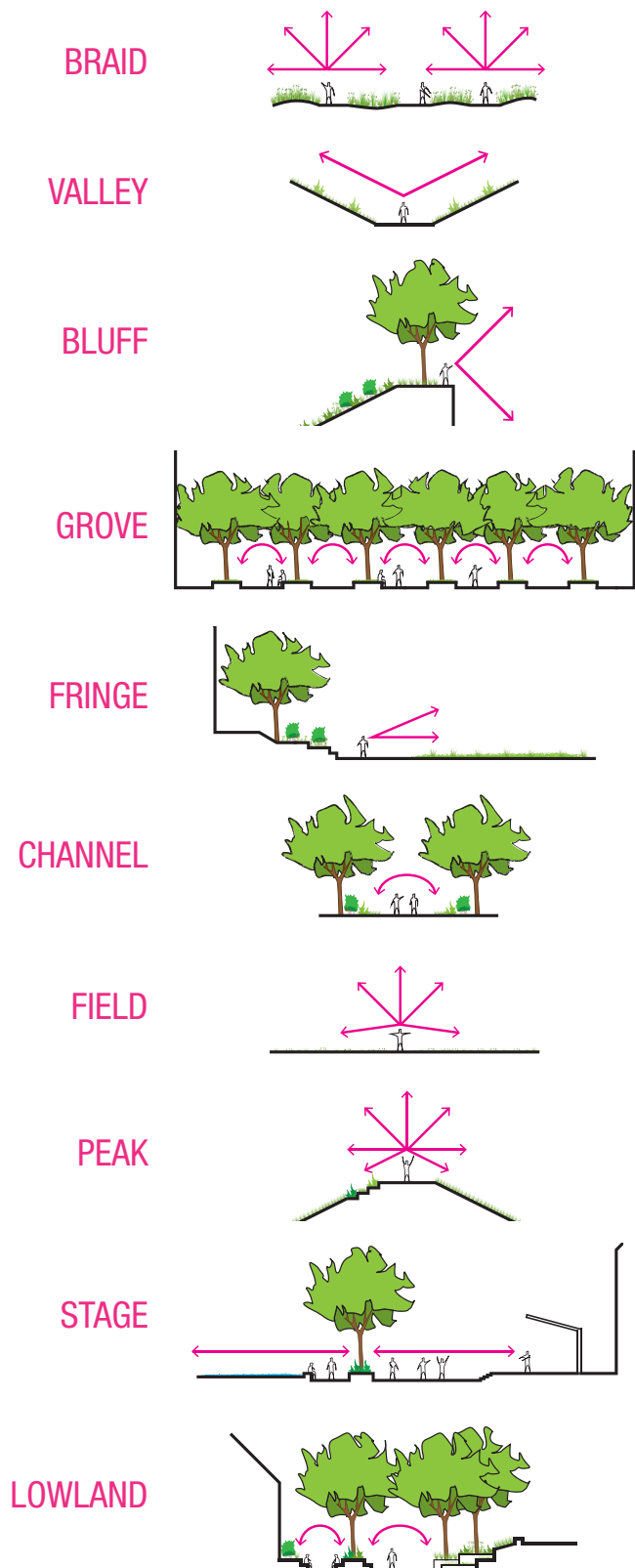
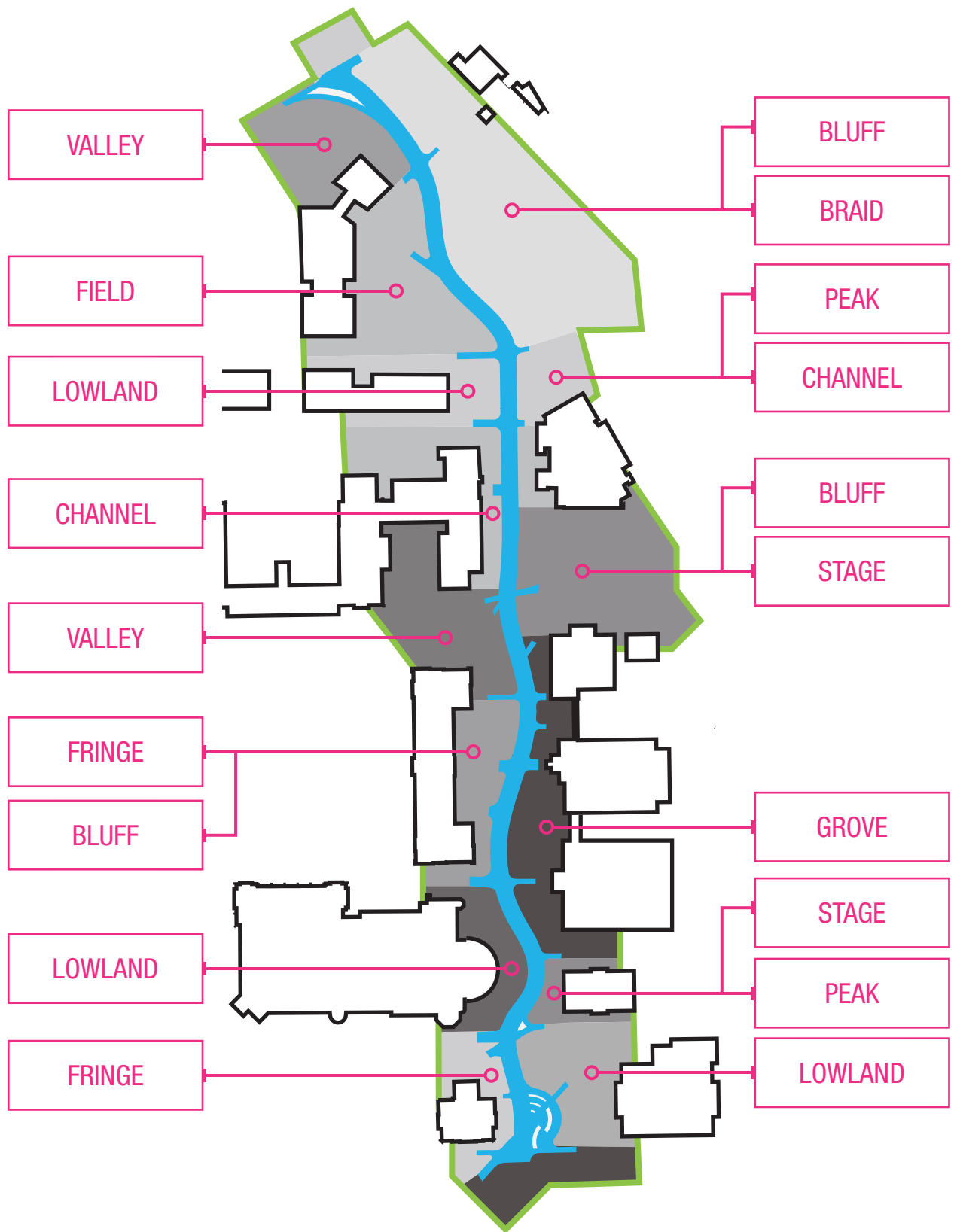


Figure 6.24 (Right) Restorative Spatial Archetypes | By Author

Figure 6.25 (Facing Page) Application Of Restorative Spatial Archetypes | By Author



RESTORATIVE CHARACTERISTICS

As previously defined, the shaping of spatial variety along the principal axis of movement within the Mid-Campus Drive corridor is vital to foster mental restoration of students within the space. Figure 6.26 on the facing page illustrates the restorative qualities of the spatial archetypes programmed within each zone of the corridor per Figure 6.25 on the previous spread. The relevance of each of the six restorative landscape themes extracted from previous literature review and case study analysis varies drastically across the corridor as each individual zone provides a different function, character, and tactile elements to support these. It is important to note that every zone within the greater corridor responds to each of the six themes at varying degrees. Specific programmatic elements and design considerations to support these are discussed in the site scale design passage of this chapter.

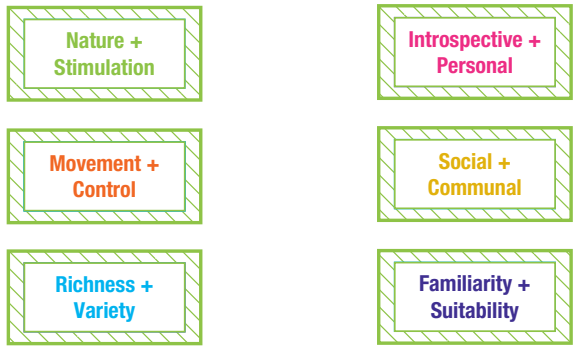


Figure 6.26 (Facing Page) Archetypal Restorative Outcome Levels | By Author



- Nature + Stimulation
- Movement + Control
- Richness + Variety
- Introspective + Personal
- Social + Communal
- Familiarity + Suitability
- = Low Degree of Relevance
- = High Degree of Relevance

0 125 250 500 Feet





## DECOMPRESSION ENTRY EXPERIENCE

In order to communicate to students and other users of the garden street that this space is powerfully restorative and unique, a series of decompression zones have been identified at major entrances to the primary circulation corridor. These gateways act as a spatial transition from the more social and active campus spaces into the calm, naturalized garden street environment. Each of these gateways provides a physical threshold through various form of overhead planes, terracing, topographic relief, planting design structure, and material changes in order to signify to individuals that this space is profoundly different than the rest of campus. Signage at major pedestrian entrances identifies the corridor as an “restorative and active garden street” to set the mood of this behavior setting within the context of the greater Kansas State University campus.

## LANDMARKS AND INTRIGUING ELEMENTS

The ability of intriguing landmarks and sculptural elements to draw people through a series of spaces is extremely relevant in the programming of this physically active and mentally restorative corridor. The experience of physical movement is deeply tied to both restorative and active landscapes, and the careful placement of inherently positive art and ornamental vegetation can evoke students’ desire to explore the corridor further, thereby engaging in more physical activity. Additionally, these landmarks can assist stressed and overwhelmed students with wayfinding within the corridor as users become familiar with the dynamic natural environment. The inclusion of landmark elements is carefully cross-referenced with the application of restorative archetypes described previously with the intention of reducing spatial ambiguity within the garden street. Overall, these landmarks help shape an energetic and cohesive experience.

Figure 6.27 (Facing Page) Corridor Gateways And Landmarks | By Author



- Entry Gateway
- Spatial Landmark/Point Of Visual Intrigue

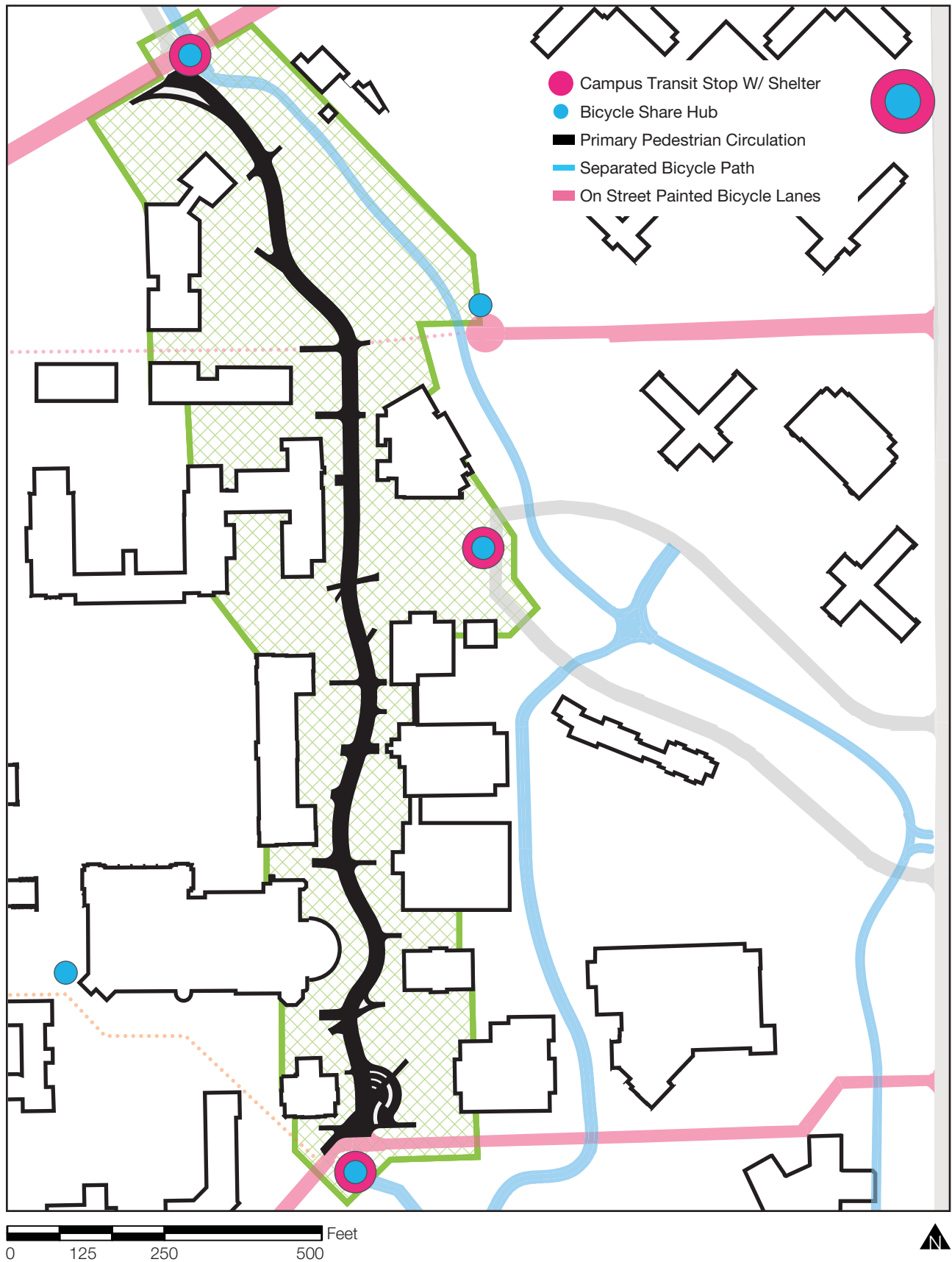


## ACTIVE TRANSPORTATION ADDITIONS

Three transportation hubs have been programmed within the corridor's boundary to maximize student access to the garden street and reduce the need for vehicular access to the campus core. Bicycle share hubs located at edges of the corridor space allow users to navigate the campus with ease. As the corridor is envisioned as a calm, slow movement pedestrian zone, pedestrian routes catered to travel speed rather than experience have been provided behind the building masses on both the East and West edges of the corridor. Two types of bicycle infrastructure allows users to choose a route based on their comfort level. By sorting out the users of each mode of travel based on their travel preferences and intended speed, the corridor allows a high degree of movement suitability to all users. Covered bicycle parking at several points in the corridor also helps to increase potential student ridership.

## PEDESTRIAN & BICYCLIST CONSIDERATIONS

Several cases of streets and public spaces that operate as “shared spaces” that allow equal access opportunities to vehicles, pedestrians, and bicyclists have proven successful in urban environments across the globe. However, within the unique case of a university campus, the massive influx of circulation between classes and during events limits the effectiveness of such a system. Therefore, the circulation space within the Mid-Campus Drive corridor is dedicated to pedestrian use with the exception of scheduled off hours service and unplanned emergency access. A multitude of potential vehicular access points within the corridor gives the corridor a great deal of flexibility in scheduling service. The garden street's width, defined primarily based on fire code access described previously, allows pedestrian circulation functionality to carry on without interruption even in an emergency scenario.





# SITE SCALE DESIGN

## DESIGN INTENT

Decisions and recommendations made at the site scale are based primarily on shaping a series of intimate and meaningful interactions with nature in a tactile manner to reduce student stress and directed attention fatigue, thereby promoting mental health. The corridor is divided into a string of ten interconnected spaces which provide mental restoration through a unique balance of the four themes identified in Figure 6.29. The site scale spaces, linked by a pedestrian circulation spine, are designed to provide restoration to both pedestrians walking through the corridor on the way to class and individuals who choose to inhabit and engage with the gardens subspaces adjacent to the main spine. Specific design elements and archetypal spatial relationships are applied to the programmatic framework established through corridor scale design to complete the application of active and restorative garden street design.

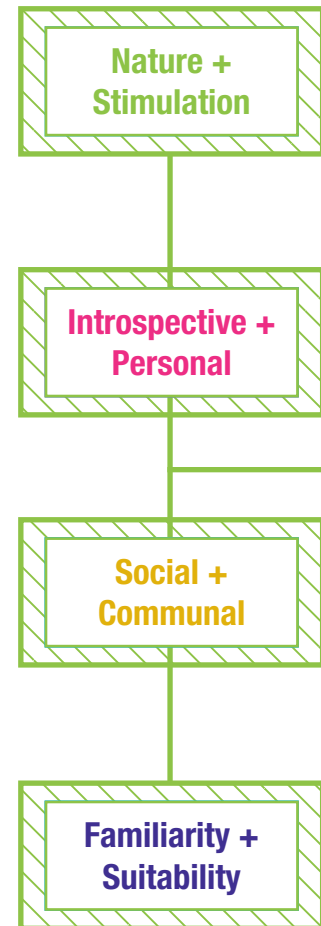


Figure 6.29 Site Scale Design | By Author

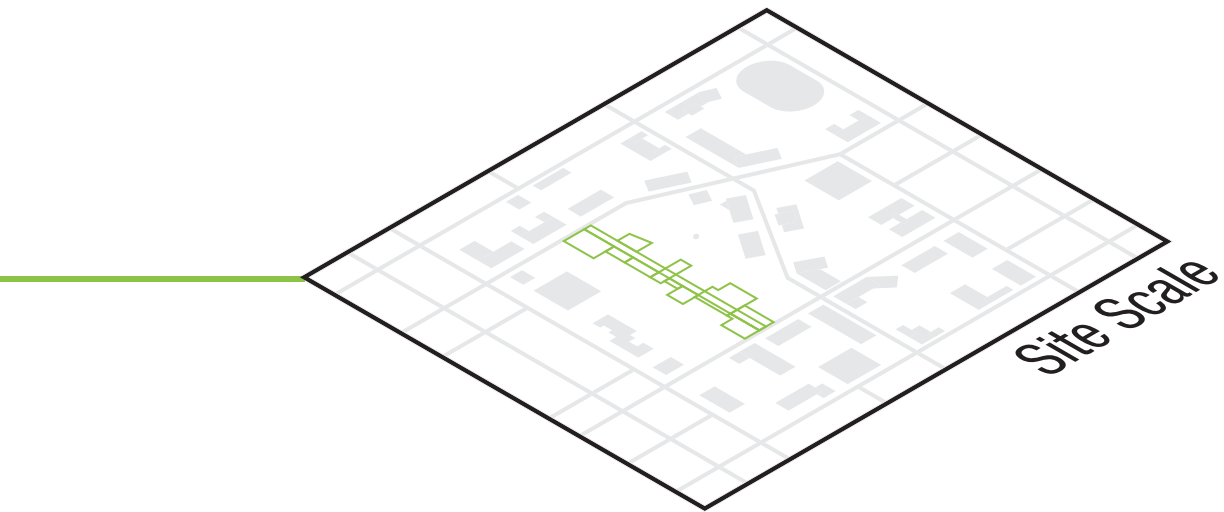


Figure 6.30 Site Scale Plan | By Author









# SPATIAL PROGRAM

Definition of spatial hierarchy was based primarily on a synthesis of existing spatial definition along the entire corridor with programmatic functions defined in the previous section. Once again, careful attention to spatial diversity and variety results in a mosaic of spatial hierarchy being distributed across the Mid-Campus corridor. The spatial hierarchy describes the relative scale of each individual space in relationship with other spaces within the overall corridor. The hierarchy simply defines this size and resulting functions of the spaces and in no way reflects upon the restoration potential of a given space. Users entering the garden from a primary access route are greeted within a primary space that decompresses their stresses and prepares them for the restorative experience of the garden street.







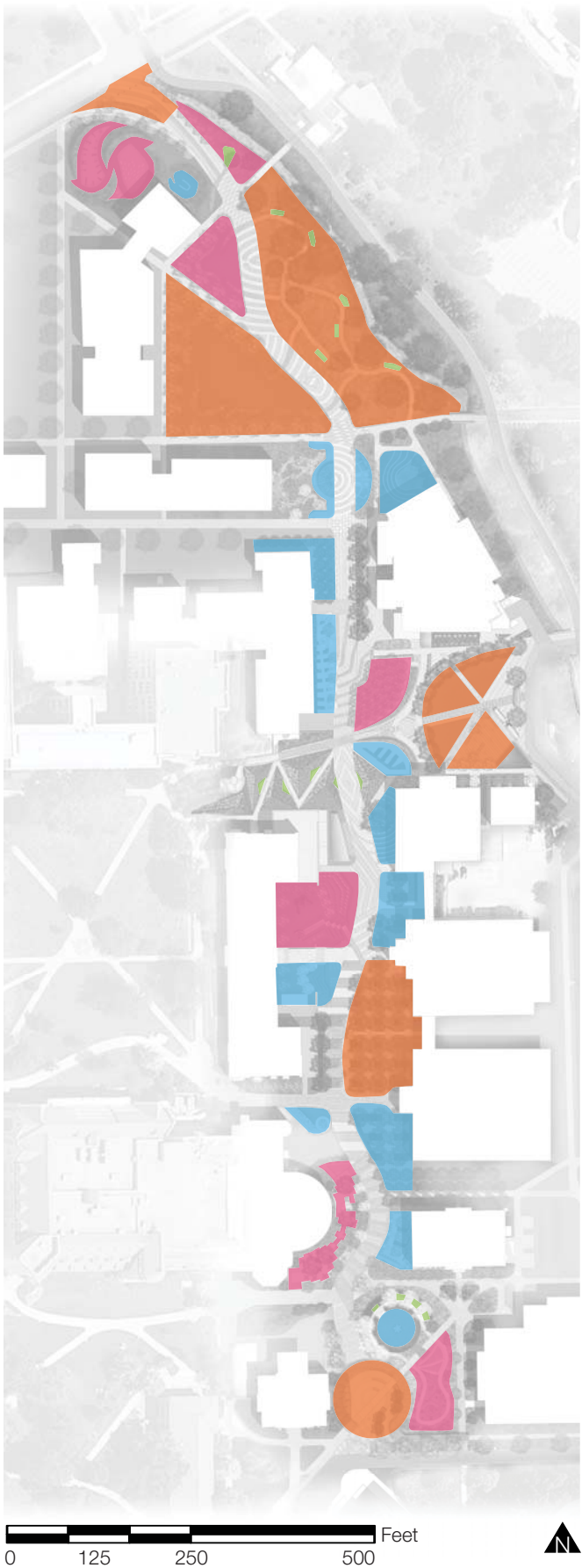
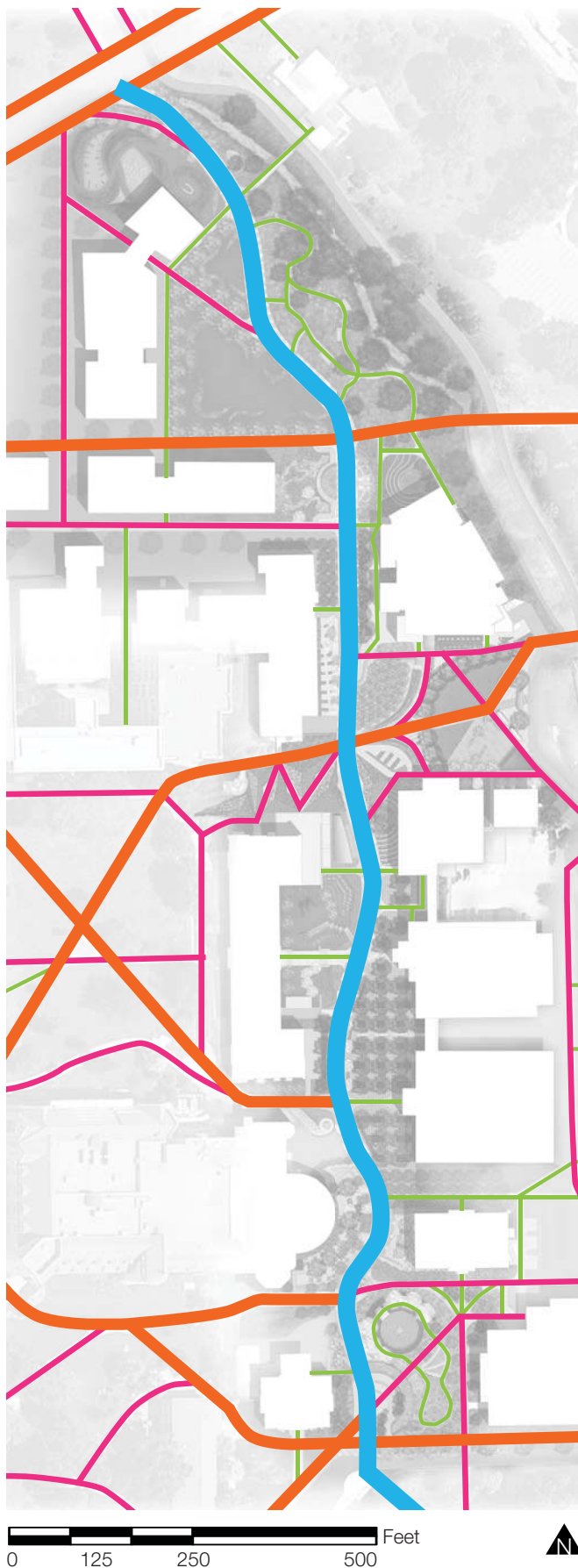
- Primary Restorative Landscape Space 
- Secondary Restorative Landscape Space 
- Tertiary Restorative Landscape Space 
- Intimate Seating Nook 

Figure 6.31 (Right) Spatial Hierarchy | By Author  
Figure 6.32 (Facing Page) Site Circulation | By Author





## CIRCULATION

Before any consideration can be made into the restorative potential of these individual spaces, the overall circulation pattern must be defined in a functional manner. If the space cannot improve on its main purpose as a circulator of students, faculty, and staff throughout the day, then all other functions will quickly deteriorate. The primary pedestrian circulation route identified in Figure 6.32 must also provide service and emergency vehicular access and has been appropriately scaled as previously described. Previously convoluted flows of pedestrians have been consolidated to provide maximum efficiency in movement while still forming a restorative experience. Users can wander a wide range of meandering trails and paths catered to significantly different environments which promote mental restoration.



- Pedestrian Spine & Emergency/Service Vehicular Access
- Primary Pedestrian Route
- Secondary Pedestrian Route
- Tertiary Pedestrian Route

### SITE VIEWS AND EXPERIENCE

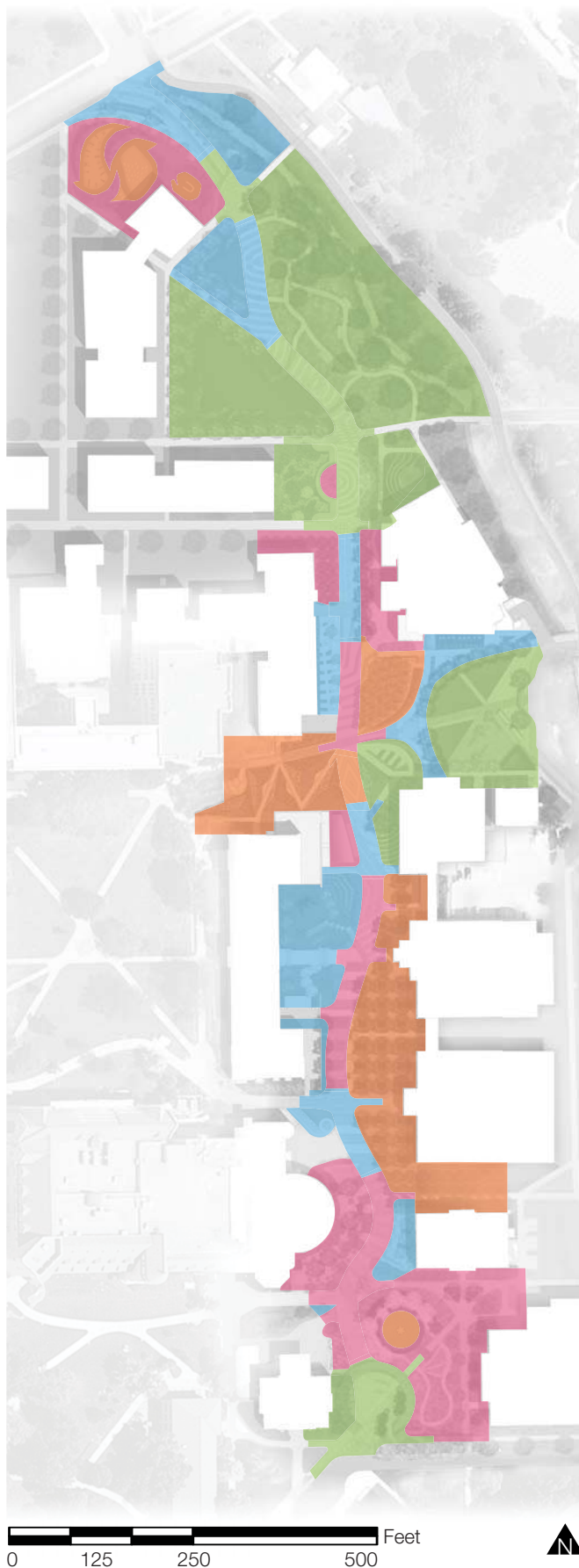
The representative diagram at right in Figure 6.33 illustrates just one example of a user's experience as they navigate the garden street moving from the southern terminus to the northern intersection with Claflin Road. The site scale spaces have been designed in such a way that a users vision wanders across the entirety of the corridor. The meandering central circulation spine creates a sense of mystery than when paired with the site scale design, shapes a dynamic user experience. As discussed in the corridor scale design, specific landmarks in the form of sculptures and particularly ornamental vegetation grab users' attention and draw them through the sequence of spaces. The spaces evolve through time as seasonal interest is programmed into the vegetation choices along the entire corridor.



- Restorative Landscape ■
- Meandering Pedestrian Spine ■
- Dynamic Viewing Experience Through Movement ↻



Figure 6.33 (Right) Site Views & Experience | By Author  
 Figure 6.34 (Facing Page) Degrees Of Enclosure | By Author



## DEGREES OF ENCLOSURE

Since richness and variety have been identified as a key corridor level design determinant, the subspaces that together define the overall corridor must reflect this richness. A highly restorative experience is created by drastically altering the degree of spatial enclosure within the corridor through use of varying density of vegetation, landform, and architectural elements. The degrees of enclosure directly relate to the programming and distribution of restorative spatial archetypes. This flexibility and spatial diversity affords users of the space increased opportunity to engage with a setting that aligns with their current mood or restorative needs. The primary pedestrian spine's enclosure changes immensely as well to shape a memorable experience for students simply walking through this garden street.



- High Degree Of Enclosure
- Moderate Degree Of Enclosure
- Low Degree Of Enclosure
- Negligible Degree Of Enclosure



## WATER FEATURES

Water features are a key feature for consideration within restorative landscapes. They act as a positive distraction to take inhabitants' minds off of the stresses and worries of the outside world. Water can be utilized within the landscape in a variety of dynamic, static, serene, and turbulent ways based on the surrounding spatial character. The white noise created by moving water within streams, fountains, and runnels can filter out outside noises and distractions to contribute to a calm environment. Additionally, reflecting pools offer an opportunity engage involuntary attention to quite literally reflect and ponder in solitude in a restorative landscape setting. Water is also seen as a symbol of life by many and its mere presence often symbolizes growth, energy, and renewal to stressed and fatigued individuals.



Water Feature 

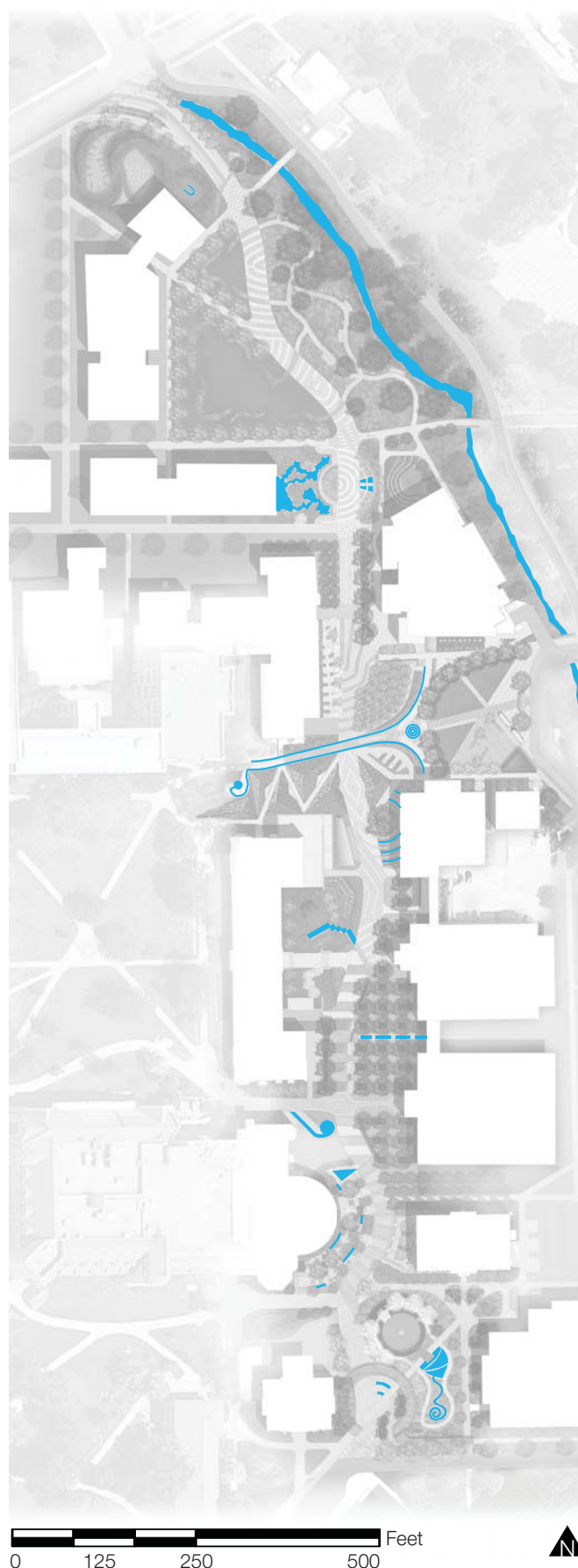


Figure 6.35 (Right) Restorative Water Features | By Author  
Figure 6.36 (Facing Page) Vegetation | By Author



## VEGETATION

Vegetation potentially represents the most crucial design element for inclusion within the restorative garden street as it initiates many of the innate biological responses to nature embedded deep within the human brain. The stimulation provided to humans through interaction with vegetation within a natural setting is a key contributor to the restorative experience defined by Kaplan (1995). As Figure 6.36 to the left demonstrates, a vast majority of the corridor is vegetated in order to maximize student interaction with nature. While a wide variety of vegetation types are laid out within individual subspaces, the overarching recognition of the dominance of green space within the corridor is required to envelop users within their environment of evolutionary adaptation.



 Vegetation

0 125 250 500 Feet

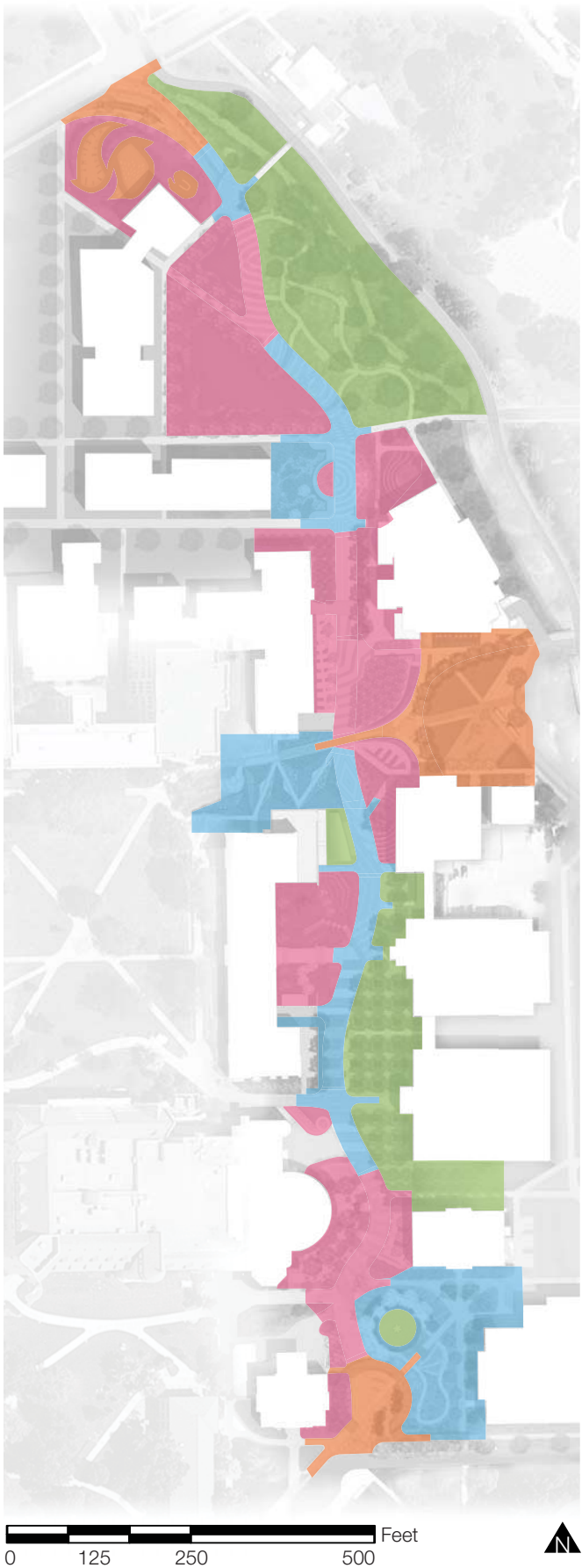


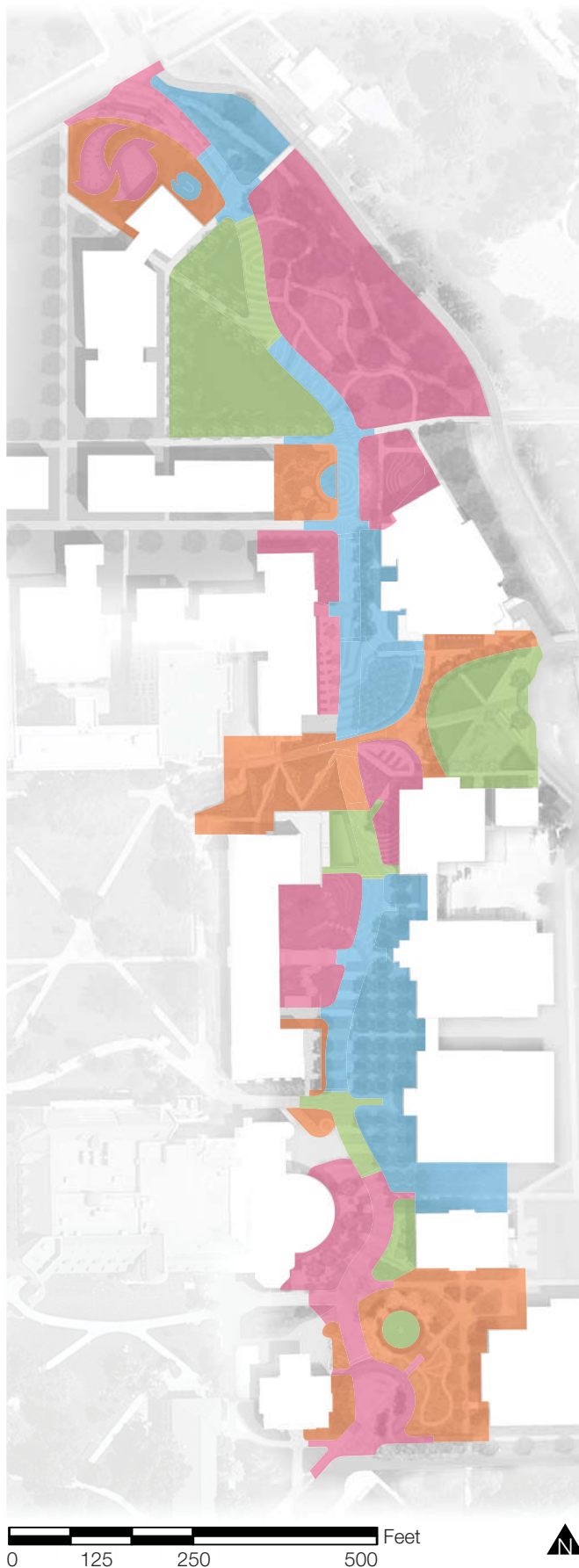
### SOCIAL VS. INTROSPECTIVE SPACES

The recurring theme of richness and variety within the overall corridor extends to the social or introspective nature of each given space along the main pedestrian spine. The three most highly social and active spaces exist at the primary entrances to the garden street. These spaces also act as the main hubs of active transportation activity as they provide connection to the network of bicycle infrastructure, transit stops, and bicycle share systems. These spaces, as social decompression zones allow social activity and gatherings to occur without interrupting highly reflective and introspective space within the most defined areas of the garden street. The overall goal is to once again provide a variety of settings that fit students' needs for mental restoration through interaction with nature and other students.



Figure 6.37 (Right) Social Vs. Introspective Level | By Author  
 Figure 6.38 (Facing Page) Sensory Stimulation | By Author





## SENSORY STIMULATION

In order to provide soft fascination and positive distractions to users of the garden street, the majority of the corridor has been designed to contain a moderate or high degree of sensory stimulation. This sensory stimulation can come in the form of colorful flowers, pleasant scents, exciting textures, sounds of birds chirping, tactile connection with plant material, and edible herbs and fruits. While sensory stimulation is key to the restorative experience, a design which only exposes users to greatest degree of stimulation may prove overly distracting and can only evoke certain mental responses. Therefore, a range of sensory stimulation is provided by providing an extremely limited plant palette within certain spaces. These spaces have a higher suitability for zen like meditation, reflection, and brooding.



- High Degree Of Enclosure
- Moderate Degree Of Sensory Stimulation
- Low Degree Of Sensory Stimulation
- Negligible Degree Of Sensory Stimulation



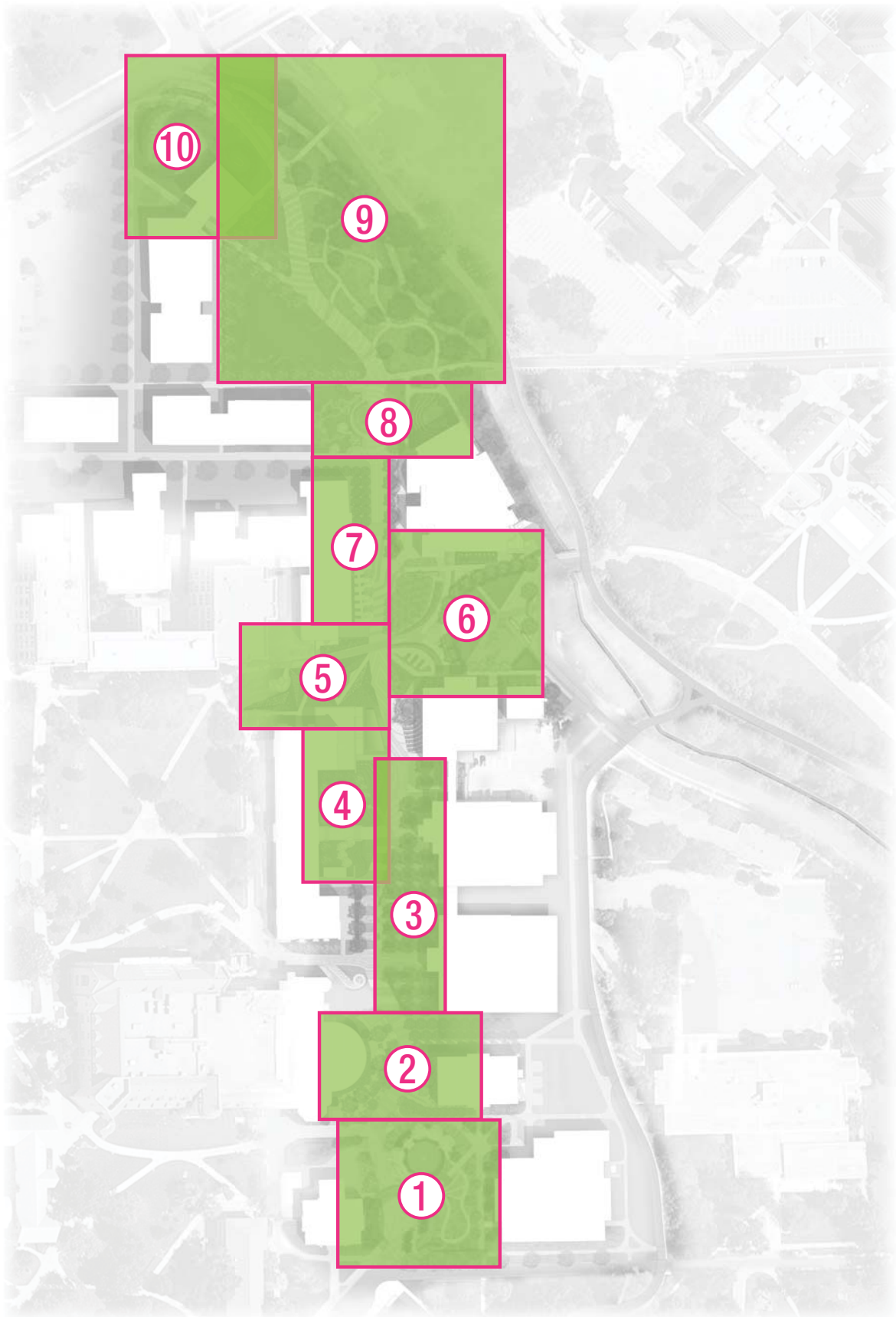
## CORRIDOR WIDE ORGANIZATION

To properly dissect and describe design decisions made at the site scale, the corridor has been subdivided into 10 individual spaces that are strung together as metaphorical “beads” in a restorative landscape necklace with the primary circulation acting as linkage. The spatial archetypes and functional programming completed through the corridor scale design informs the delicate molding of both intimate and expansive spaces along the garden street. Each subspace listed to the right applies a different balance of the programmatic elements and design considerations identified through synthesis of the restorative case studies. A narrative of each subspace and the applicable restorative considerations and functional uses supports decisions made at this scale of design. Design imagery within all ten spaces illustrates the vision for the aesthetic character and mood that makes each restorative space unique.

## MID-CAMPUS GARDEN STREET SUBSPACES

- ① THE COMMONS
- ② THE PORCH
- ③ THE WOODLAND
- ④ THE ARTS TERRACE
- ⑤ THE PYRAMIDS
- ⑥ THE THEATER
- ⑦ THE ORCHARD
- ⑧ THE TRIBUTARY
- ⑨ THE PRAIRIE
- ⑩ THE GYM

Figure 6.39 (Right) Site Scale Spaces | By Author



# THE COMMONS

## DESIGN NARRATIVE

The commons is the primary entrance to the garden street at the southern terminus of the corridor. It acts as one of three major decompression zones that are primarily hardscaped and contain the largest amount of social interaction and activity. This space takes on the form of a circular plaza and is therefore very flexible to cater to a wide range of activities. The legibility created through use of simple geometric forms within this space allows users to quickly understand and explore the entrance to the garden street without much further investigation. Two spatial archetypes, the stage and the lowland, are juxtaposed and provide users with a balance of social and introspective experiences based on the zone they occupy. A degree of spatial extent is provided within the space by a minimalist trellis that defines the entrance into the overall corridor. Overall, this coherent space sets the mood for users to become mentally restored throughout the corridor.

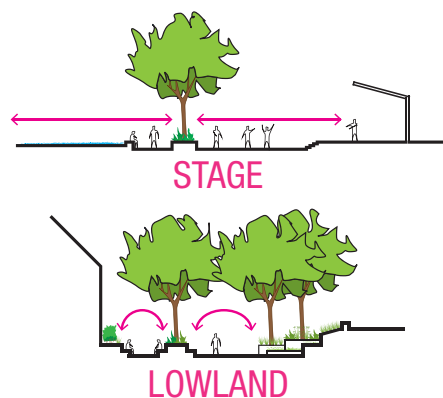


Figure 6.40 (Above) Spatial Archetype 1 | By Author

Figure 6.41 (Facing Page) Key Plan 1 | By Author



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## RESTORATIVE APPLICATION WITHIN SPACE

The commons, seen to the right in Figure 6.43 is made up of three linked spaces - an entry plaza, an immersive walking loop, and a meditative labyrinth. The open, legible plaza space decompresses users as they enter the garden street and allows planned and unplanned social interaction. The sunken space of the walking loop removes users from the hustle and bustle of the nearby main pedestrian spine and provides several intimate seating nooks along its path. A central planting area within this loop slopes upward and allows for a spiral water feature to artistically drain into the adjacent reflecting pools. The labyrinth, screened by a seven foot hedge with several 4 foot high perforations, allows users to get in touch with sacred geometry and perform meditation through movement. The proportions of this labyrinth are taken directly from the famed labyrinth inscribed within the floor of the Chartres Cathedral in Chartres, France.

## LEGEND: ACTIVE/RESTORATIVE FEATURES

- ① OPERABLE BOLLARDS
- ② OVERHEAD SHADE STRUCTURE
- ③ LABYRINTH
- ④ MEANDERING WALKING LOOP
- ⑤ LAYERED, SENSORY ENGAGING PLANTING
- ⑥ DENSE HEDGE ARMATURE
- ⑦ ENTRANCE/GATHERING PLAZA
- ⑧ OVERFLOWING REFLECTING POOLS
- ⑨ INTIMATE SEATING NOOKS
- ⑩ TRANSIT STOP AND BICYCLE SHARE HUB



**SECTION AA**

Figure 6.42 (Above) Site Section AA | By Author

Figure 6.43 (Facing Page) Illustrative Plan 1 | By Author





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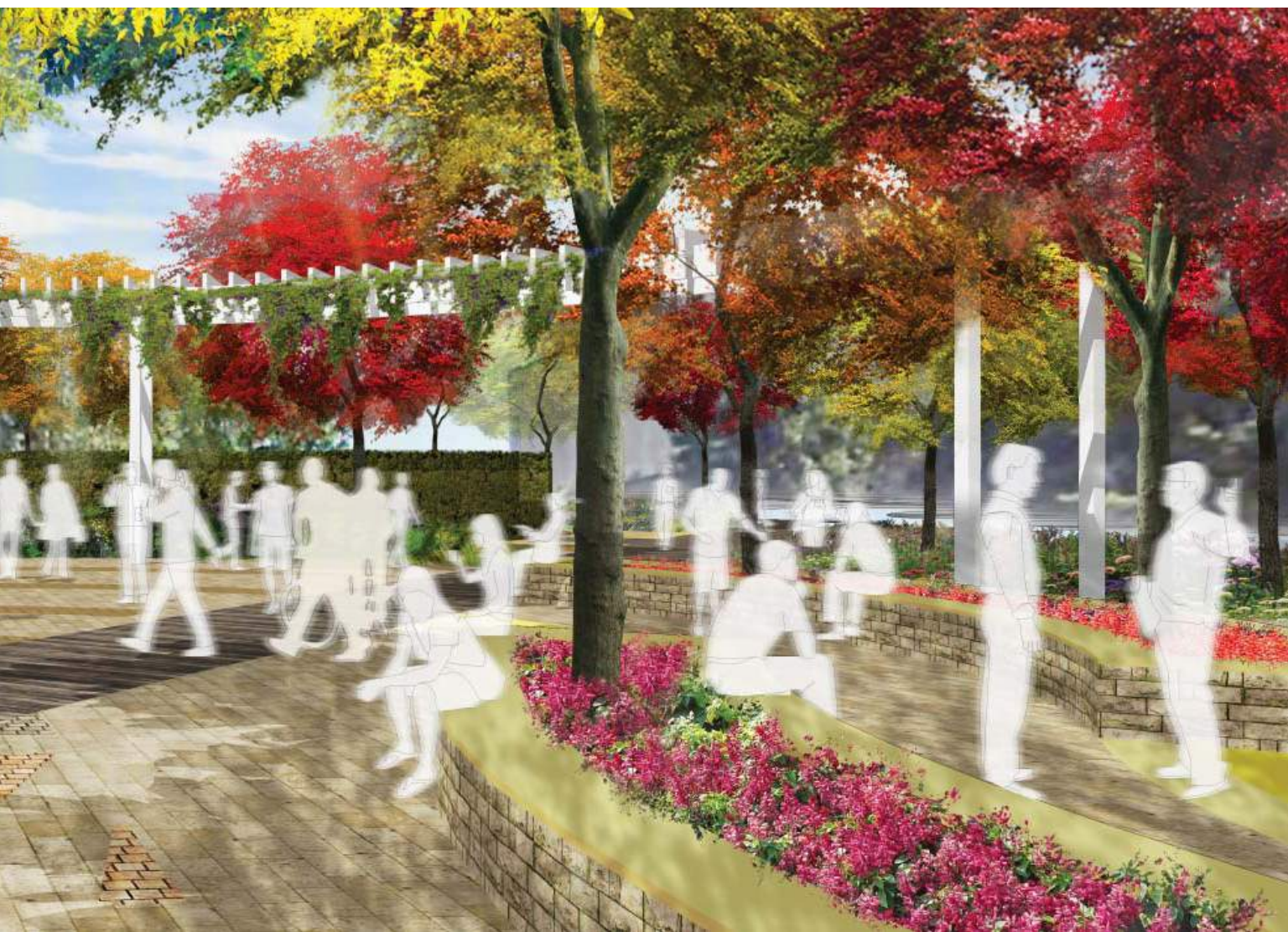






Figure 6.44 (Above) Garden Street Decompression/Gateway Court | By Author







# THE PORCH

## DESIGN NARRATIVE

The porch represents a restorative interpretation of a tradition architectural element within the campus context. A distinct lack of functional outdoor gathering, reading, or studying space adjacent to one of the most frequented buildings on campus, Hale Library led to the creation of this space. The porch is intended to be a productive and focused zone within the corridor. By submerging the space directly adjacent to the library, users are provided with an increased sense of separation from those walking to and from class along the pedestrian spine. This separation allows students to focus more on activities such as reading, studying, and general relaxation. Across the main pedestrian spine, a raised gathering space allows increased visibility through the corridor. This raised space is more social in nature and has a several communal tables and bars to allow collaboration between students. Overall, the porch is a highly functional, academic space.

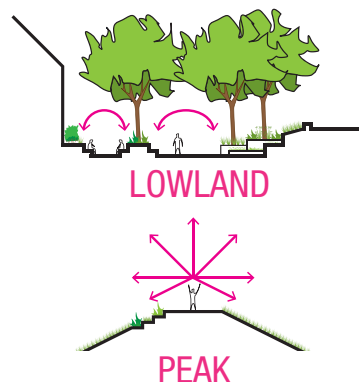
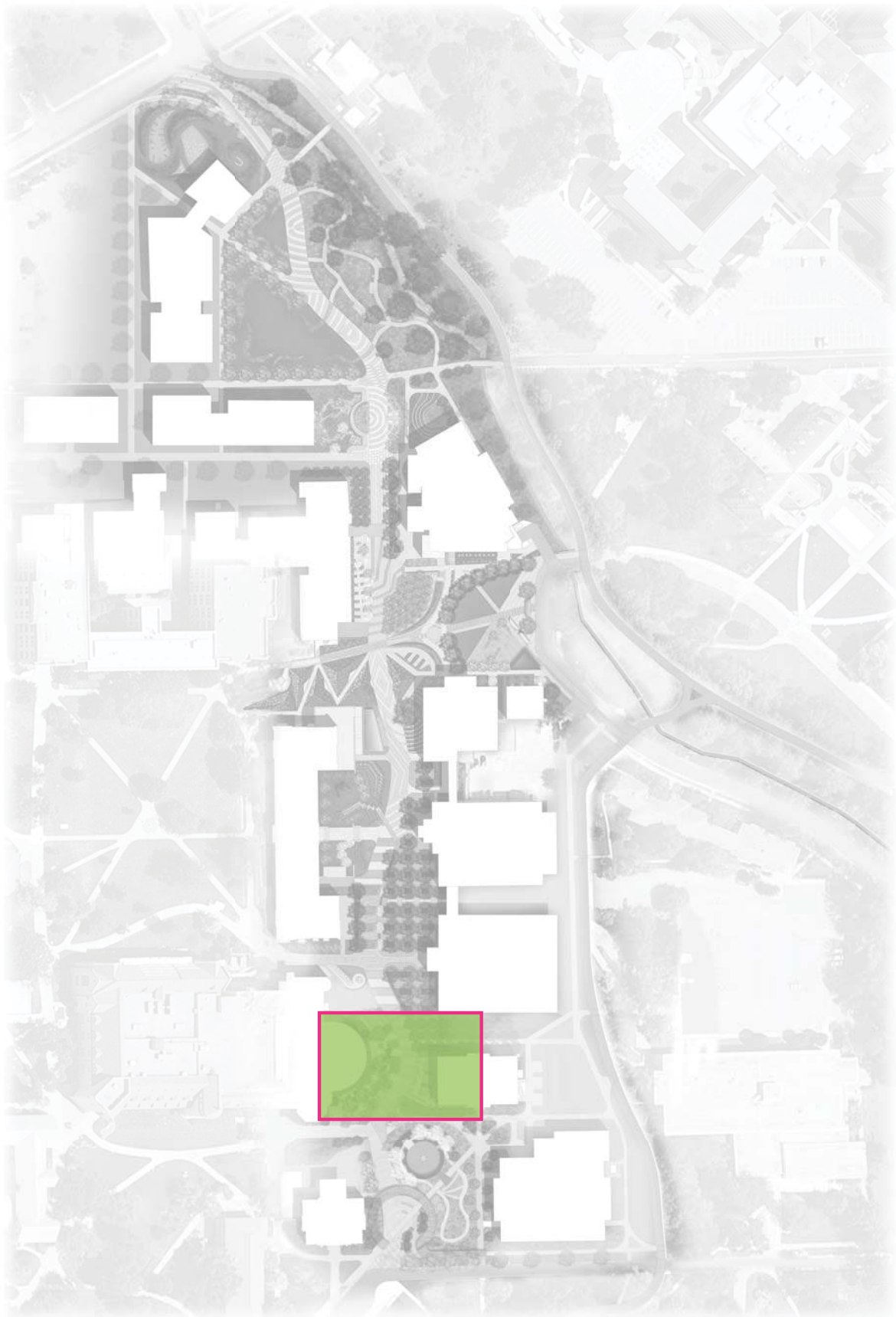


Figure 6.45 (Above) Spatial Archetype 2 | By Author

Figure 6.46 (Facing Page) Key Plan 2 | By Author



0 125 250 500 Feet



## RESTORATIVE APPLICATION WITHIN SPACE

The variation of enclosure and scale exhibited within the design of the porch creates opportunities for users to interact with intimate spaces. Individuals studying or reading within the sunken space adjacent to the library are fully immersed in the fascination of a sensory packed natural space. The raised planter beds and built in benches within the sunken space shape a refuge environment and allow students to engage with plant materials in a very tactile manner. Several tables with movable seating allow users to change the space to their own needs, maximizing their ability to control the environment. The elevated, communal gathering space on the East side of the pedestrian spine affords opportunities for students to provide social support, play games, work on group projects, etc... This space provides a high degree of prospect and encourages interaction between users inhabiting the spaces and those circulating by them

## LEGEND: ACTIVE/RESTORATIVE FEATURES

- ① ADA ACCESSIBLE RAMPS
- ② UNAMBIGUOUSLY POSITIVE ART
- ③ STUDYING AND DINING COURT
- ④ LARGE COMMUNAL TABLES
- ⑤ TIERED FOUNTAINS
- ⑥ SCULPTURAL WATER FEATURE
- ⑦ BUILT IN BENCH SEATING
- ⑧ COMMUNAL BAR AND STOOLS
- ⑨ DENSE ENTRY BOSQUE
- ⑩ HIGHLY ORNAMENTAL RAISED PLANTER



**SECTION BB**

Figure 6.47 (Above) Site Section BB | By Author

Figure 6.48 (Facing Page) Illustrative Plan 2 | By Author





0 25 37.50 75 Feet





# THE WOODLAND

## DESIGN NARRATIVE

The woodland has been sited within the most spatially enclosed zone of the corridor and establishes an even greater degree of enclosure through use of dense arrangement of wide branching trees within raised planter beds. This space is intended to provide a shaded, fully enclosed environment that allows users to feel as if they are in an entirely different place. Trees chosen for planting within this zone have a large amount of seasonal interest throughout the year and can be decorated with artistic lights in the winter time to create a cozy, memorable place. The trees planted within this space create a ceiling like canopy that extends over much of the main pedestrian circulation spine to blur the edges between circulation and occupiable space. The orthogonal and repeated forms of raised planter beds within the woodland shape many intimate gathering spaces of various sizes.

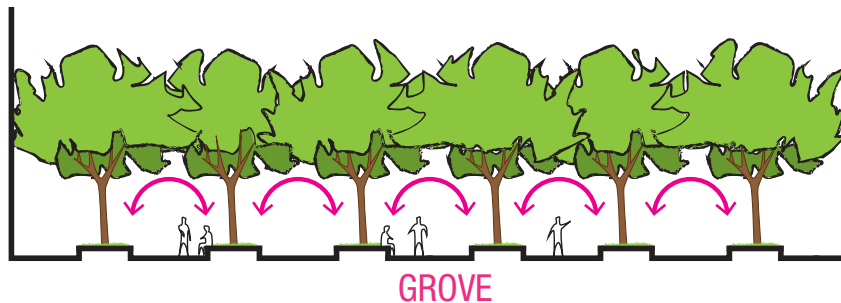
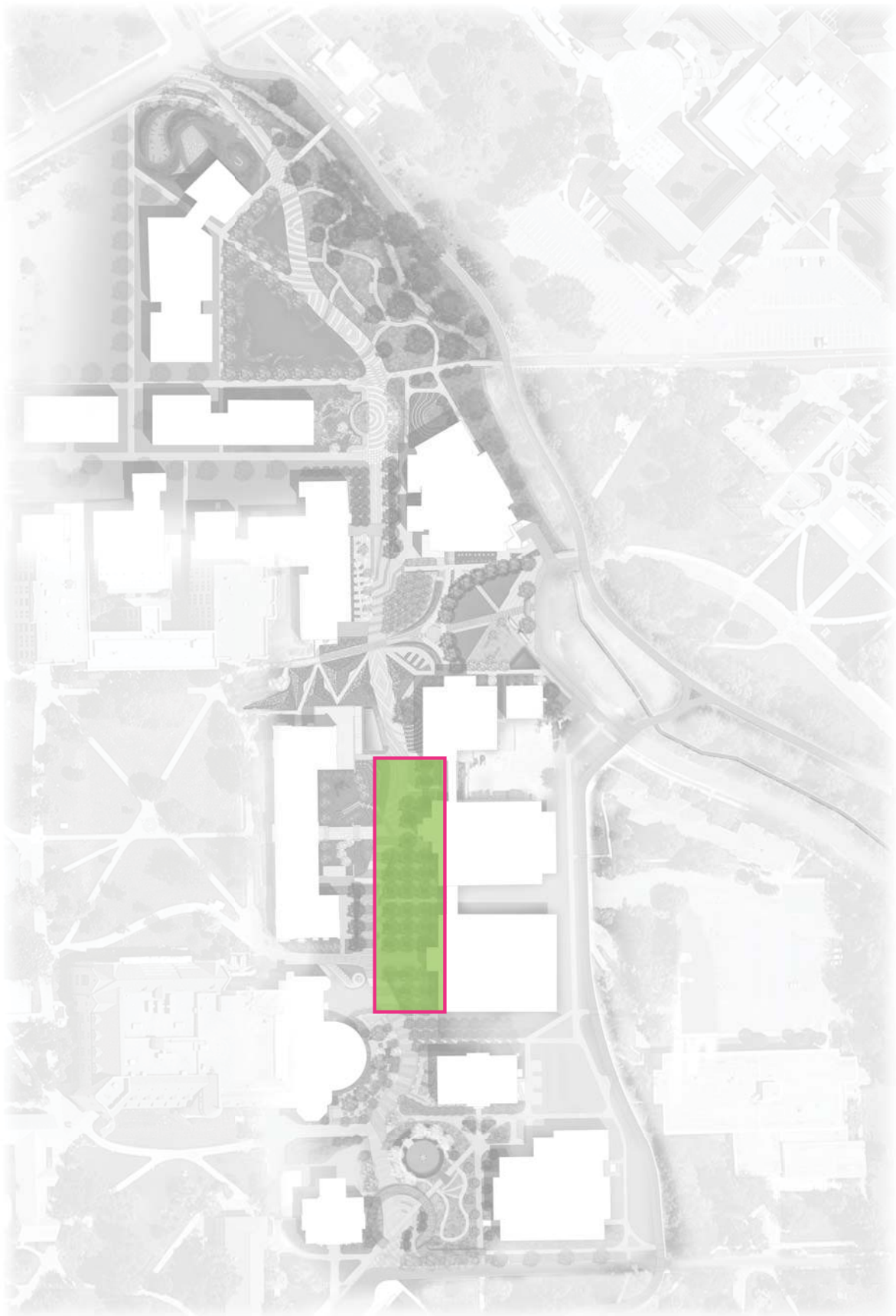


Figure 6.49 (Above) Spatial Archetype 3 | By Author

Figure 6.50 (Facing Page) Key Plan 3 | By Author



## RESTORATIVE APPLICATION WITHIN SPACE

In order to shape a highly meditative and reflective space, the degree of planting variation and sensory stimulation was purposefully limited within the woodland. A limited planting palette of wide branching hawthorns planted on a grid and evergreen ground cover within the raised beds allows the space to have a high degree of clarity and coherence. Raised planter beds create clear separation from the main pedestrian spine, allowing personal reflection and quiet contemplation to occur. The ground plane within this subspace consists of pavers embedded into a structured bed of vegetation and allows maximum exposure to a limited color palette of vegetation. A linear reflecting pool has been extruded up within the central area of this space and allows tactile interaction with water to occur. Delicate veils of water cascade over the edges of these corten steel lined pools to provide relaxing white noise.

## LEGEND: ACTIVE/RESTORATIVE FEATURES

- ① RAISED LINEAR REFLECTING POOL
- ② CORTEN STEEL PAVING CONNECTS SPACES
- ③ VINE COVERED TRELLIS
- ④ SCULPTURAL WATER FEATURE
- ⑤ VEGETATED PAVING PATTERNS
- ⑥ DENSE HAWTHORNE GROVE CREATES CEILING
- ⑦ RAISED PLANTERS SHAPE GATHERING SPACE



## SECTION CC

Figure 6.51 (Above) Site Section CC | By Author

Figure 6.52 (Facing Page) Illustrative Plan 3 | By Author





Feet







Figure 6.53 (Above) Dense Grove Shapes A Serene, Contemplative Atmosphere | By Author





# 4

## THE ARTS TERRACE

### DESIGN NARRATIVE

The wall which currently separates Willard Hall from any street level public activity was clearly identified as liability during corridor scale analysis, and has been thoughtfully deconstructed and reassembled as a multi-level arts terrace. An underutilized, elevated lawn is connected to the main pedestrian spine and redefined as a sculpture garden to display both permanent works as well as a changing gallery of student sculptures for viewing and appreciation of the general student body. By extracting student work outside of Willard Hall and establishing a restorative sculpture garden, the building can connect to the surrounding landscape in a more meaningful manner. Additionally, the visual experience of walking alongside an occupiable, terraced lawn is much more aesthetically pleasing than that of walking next a seven foot tall wall. Overall, the arts terrace provides a space for students to view positive art pieces and lounge comfortably.

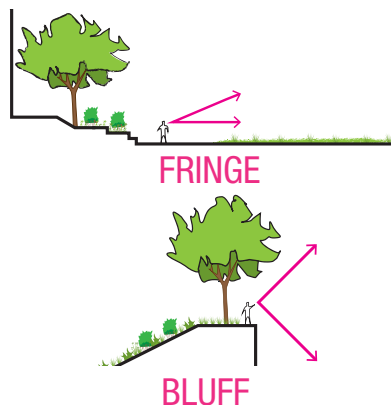
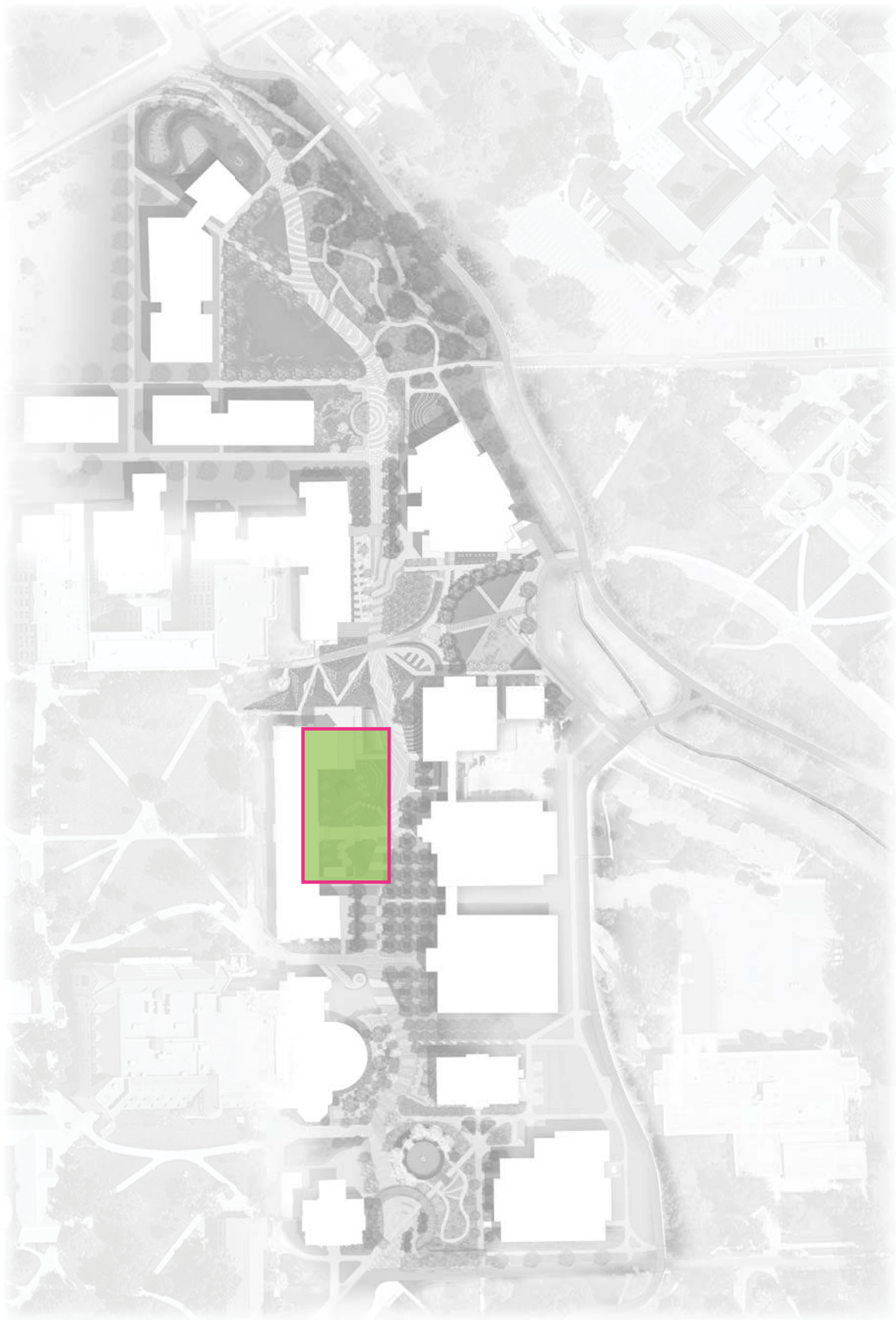


Figure 6.54 (Above) Spatial Archetype 4 | By Author

Figure 6.55 (Facing Page) Key Plan 4 | By Author



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## RESTORATIVE APPLICATION WITHIN SPACE

By engaging the space all the way to the facade of Willard Hall, the spatial extent of the corridor has been increased. The arts terrace is unique in that it simultaneously allows introspective reflection and enjoyment by individuals while also affording gathering and seating opportunities for groups of students ranging in size from a couple friends to an entire class. A cascading water feature reduces users' use of directed attention and allows students to sit at its edge and dip their feet in while lounging on highly maintained turf grass. Paired patterns visually unite this space with the woodland described within the previous spreads. Regional attributes including limestone terrace walls and sculptures of recognizable local flora and fauna allow students to feel more connected with the sense of place created within the terrace. Directly to the North of the terraces, a large overhead structure is placed to allow students to park their bicycles without fear of weathering.

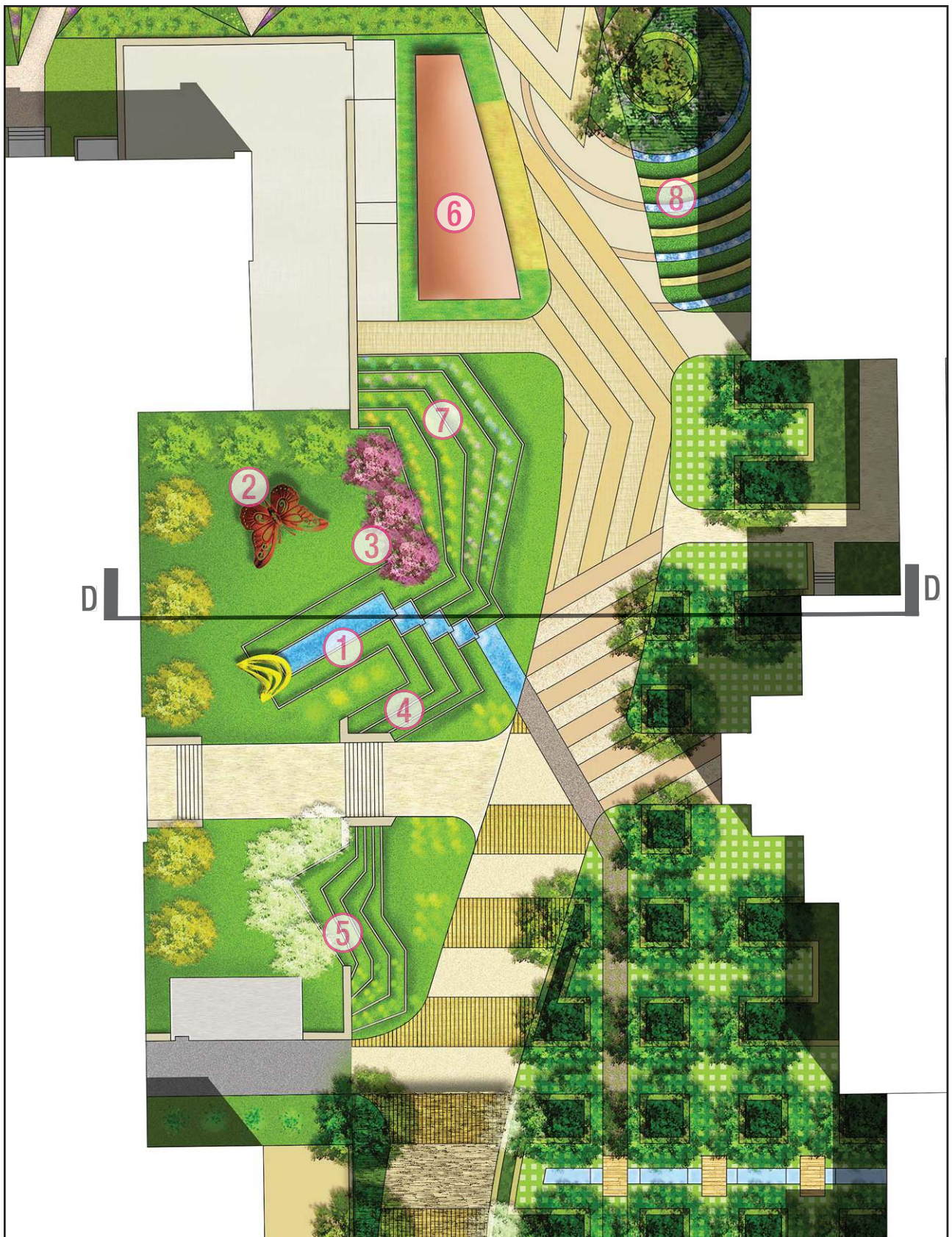
## LEGEND: ACTIVE/RESTORATIVE FEATURES

- ① TIERED ORTHOGONAL FOUNTAIN
- ② POSITIVE ART BASED ON NATURE FEATURES
- ③ HIGHLY ORNAMENTAL VEGETATION
- ④ TERRACES ALLOW STUDENTS TO LOUNGE
- ⑤ FLEXIBLE CLASSROOM/GATHERING SPACE
- ⑥ COVERED BICYCLE PARKING
- ⑦ ACCESSIBLE WILDFLOWER TERRACES
- ⑧ ZEN MEDITATION GARDEN



SECTION DD

Figure 6.56 (Above) Site Section DD | By Author  
Figure 6.57 (Facing Page) Illustrative Plan 4 | By Author



0 25 37.50 75 Feet



# 5

## THE PYRAMIDS

### DESIGN NARRATIVE

The primary campus quadrangle's main connection to the Mid-Campus corridor occurs within this space and is designed to create an implied gateway into the garden street. As a great deal of elevation change occurs between the quadrangle and the corridor, creation of a energetic ADA accessible transition space was the primary consideration within this zone. The valley archetype is abstracted and applied through the arrangement of a mosaic of faceted geometric landforms. The landforms provide a high degree of refuge to inhabitant and require users to constantly reorient themselves to their surroundings along the switchback circulation pattern. Since the speed of movement and directness of circulation route are of principal importance to college students moving through the campus, the direct route to the quadrangle has been maintained and improved through placement of a sloping, linear water runnel.

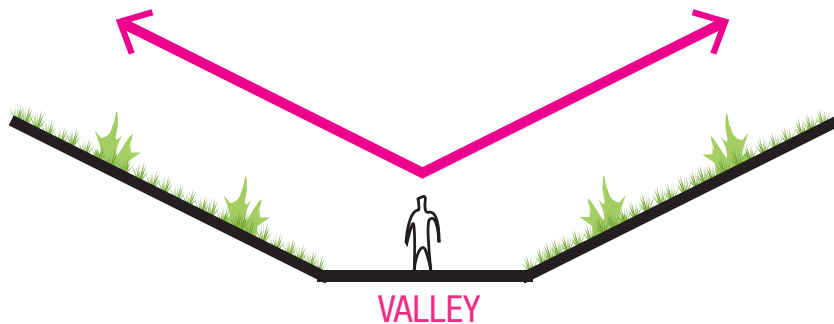


Figure 6.58 (Above) Spatial Archetype 5 | By Author

Figure 6.59 (Facing Page) Key Plan 5 | By Author





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## RESTORATIVE APPLICATION WITHIN SPACE

A high degree of sensory stimulation has been designed into this space by planting stimulating native planting on the crystalline landforms which define this space's circulation route. Each facet of these geometric landforms has purposely been planted with a variety of native species that share similar aesthetic characteristics so that as users navigate the space, the facets provide a great deal of visual contrast and intrigue. Along the ADA accessible pathway, several recessed seating nooks with a high degree of refuge and prospect allow stressed students to separate themselves from the oftentimes exposed spaces of the campus. This space's switchback form also promotes a quiet environment with a large amount of mystery. Spatial ambiguity is limited through the definition of specific circulation route to navigate the geometric landforms as they cascade down the hill from the quadrangle to this human scaled garden street.

## LEGEND: ACTIVE/RESTORATIVE FEATURES

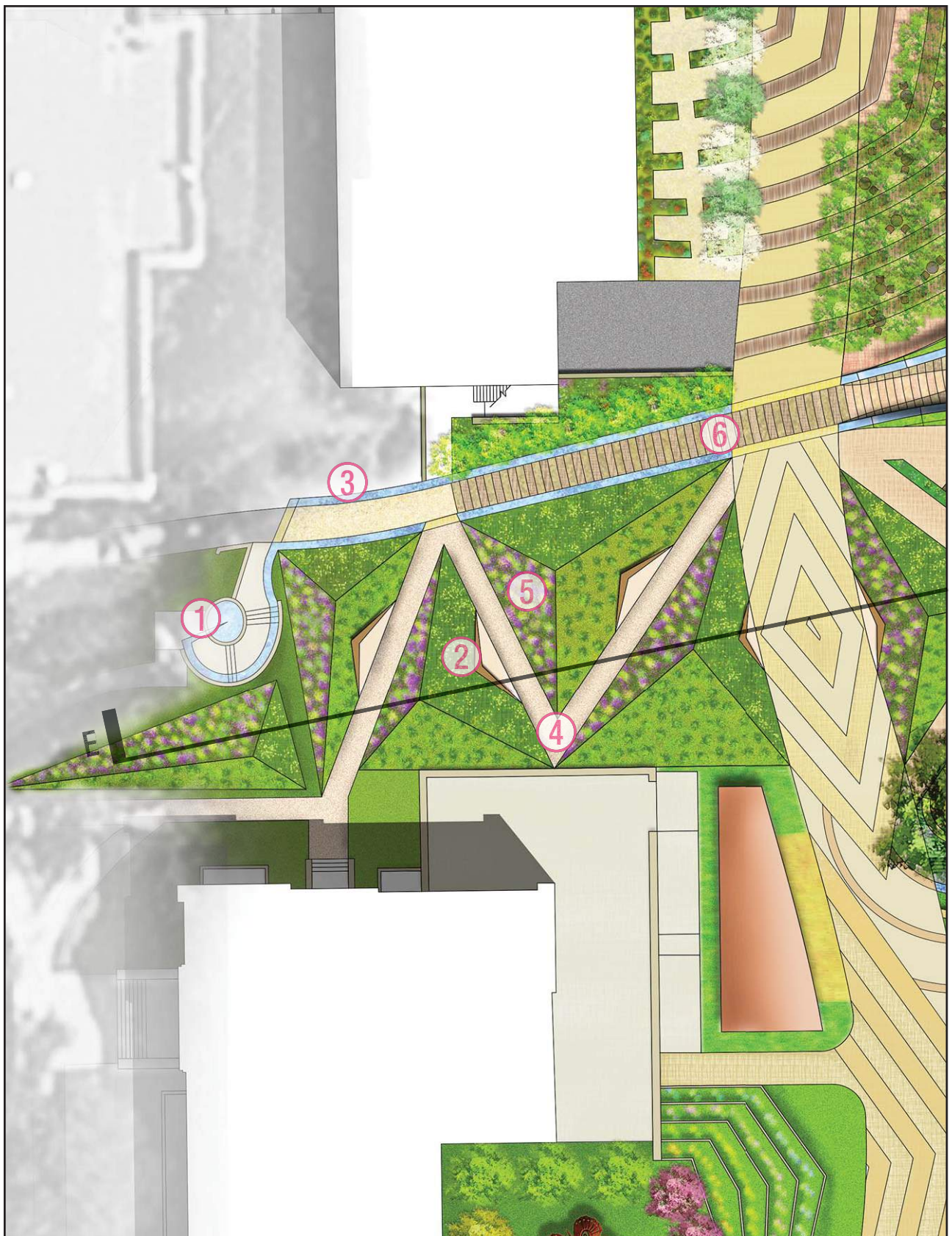
- ① RETROFITTED FOUNTAIN SOURCE
- ② HIGHLY MAINTAINED GEOMETRIC LANDFORMS
- ③ RAISED WATER RUNNEL FRAMES ENTRANCE
- ④ ADA ACCESSIBLE SWITCHBACK TRAILS
- ⑤ SENSORY ENGAGING PLANT MATERIALS
- ⑥ PAVING PATTERNS VISUALLY UNITE SPACES



**SECTION EE**

Figure 6.60 (Above) Site Section EE | By Author

Figure 6.61 (Facing Page) Illustrative Plan 5 | By Author



# 6

## THE THEATER

### DESIGN NARRATIVE

This space acts as the nexus for student interaction within the corridor and maximizes potential social interaction within its boundary. The space acts as a key transition between the overall campus fabric and the active and restorative garden street as users arrive on foot, bicycle, transit, and vehicle. Therefore, it must first welcome users in an expansive embrace and subsequently prepare them for entry into the primary axis of the active and restorative garden street. The space is envisioned as a lively zone of student interaction, collaboration, and social interaction and designed to reflect these goals. The scale, vehicular accessibility, and existing topographic conditions of the space make it a prime location to hold public forums, concerts, lectures, and other university events. Programming flexibility into this primary space will allow students to use the space in various ways depending on the season, weather, and other environmental factors.

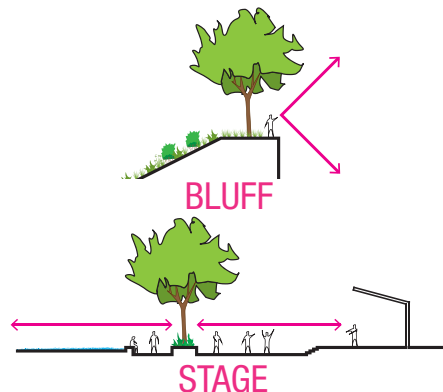
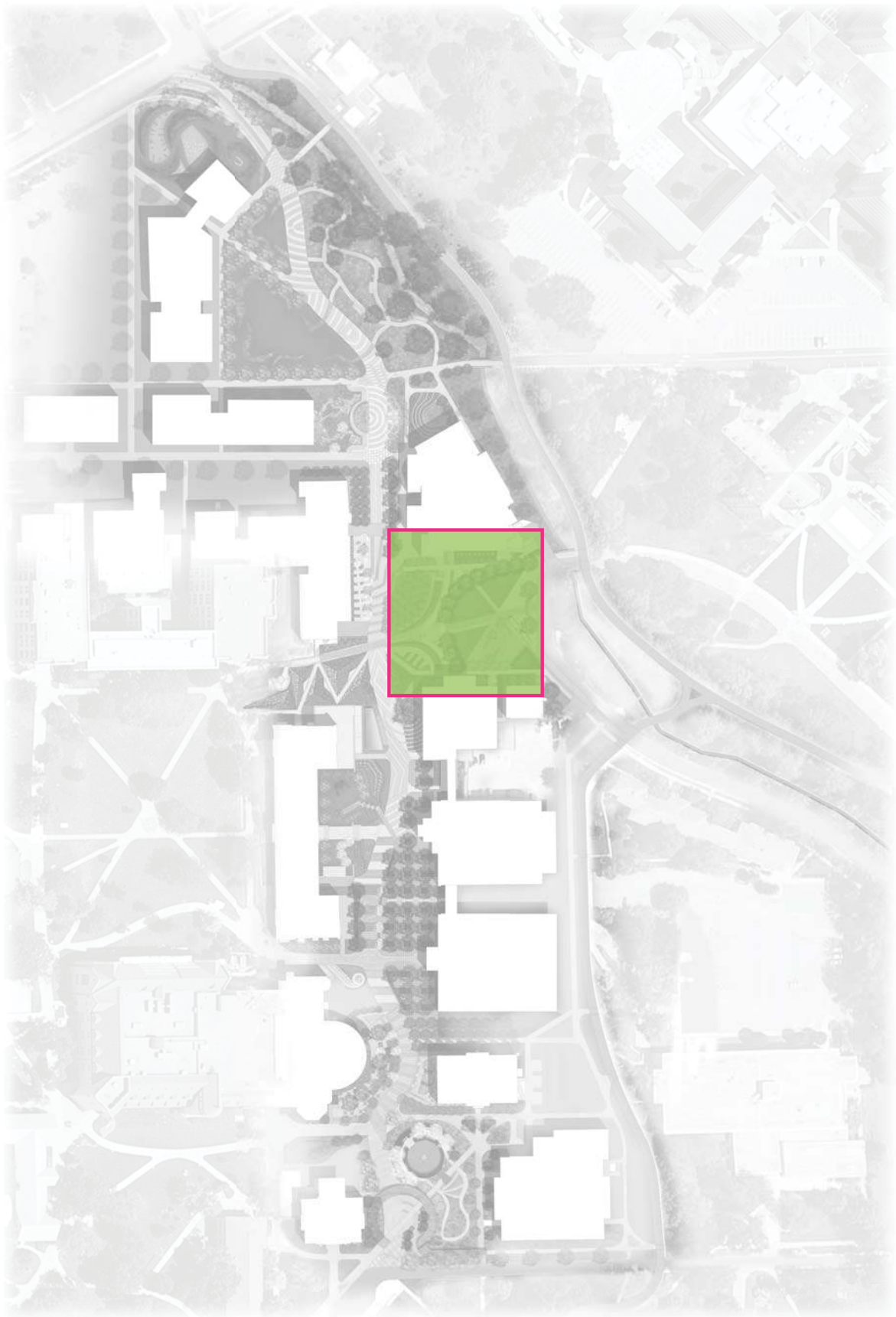


Figure 6.62 (Above) Spatial Archetype 6 | By Author

Figure 6.63 (Facing Page) Key Plan 6 | By Author





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## RESTORATIVE APPLICATION WITHIN SPACE

The theater provides the most defined programming of any space within the Mid-Campus corridor. Its form is derived to shape a meaningful entrance experience into the main garden street space which lies approximately ten feet higher than the transit stop on the East side of the space. The transition from the social transit hub and performance stage to the garden street is elucidated through significant grade change as users penetrate two welcoming armatures of tiered planters and fountains. These densely planted armatures complete with cascading water runnels define elevated terrace spaces which overlook the sloping lawn and performance stage. The northern terrace space, densely populated with delicate conical formed trees serves as a dining terrace to provide additional outdoor seating to the cafe within the Leadership Studies building. A variety of seating options within the space affords users a great deal of spatial control.

## LEGEND: ACTIVE/RESTORATIVE FEATURES

- ① DINING GROVE DEFINED BY DELICATE FOLIAGE
- ② COMMUNAL TABLES IN SEMI PRIVATE SPACE
- ③ MULTIFUNCTION SLOPED LAWN
- ④ PERFORMANCE STAGE W/ OVERHEAD CANOPY
- ⑤ TRANSIT STOP SHELTER
- ⑥ BICYCLE SHARE HUBS
- ⑦ SUBMERGED BUTTERFLY GARDEN
- ⑧ COVERED BICYCLE PARKING
- ⑨ BICYCLE LANE ACCESS
- ⑩ KEY LANDMARK FOUNTAIN



**SECTION FF**

Figure 6.64 (Above) Site Section FF | By Author

Figure 6.65 (Facing Page) Illustrative Plan 6 | By Author



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Figure 6.66 (Above) Entry Experience Into Garden Street From Transit Stop | By Author







# THE ORCHARD

## DESIGN NARRATIVE

The orchard has been sited directly outside of the building that houses studies related to grain science and industry to act as a living laboratory for students to conduct experiments related to agriculture and food systems. Cultivation of various fruit, vegetable, and grain is the primary purpose of this space. The food produced within the orchard will be utilized within the department's bakery to create a closed loop farm to table scenario within the campus. In order to maximize accessibility to these production gardens, raised planter beds define the majority of spaces. Opportunities for horticultural therapy are present within this space by initiating collaboration between the Horticulture department and Counseling Services within Kansas State University. Guided therapeutic gardening lessons will allow students to learn about more healthy ways to cultivate food while engaging in horticultural therapy.

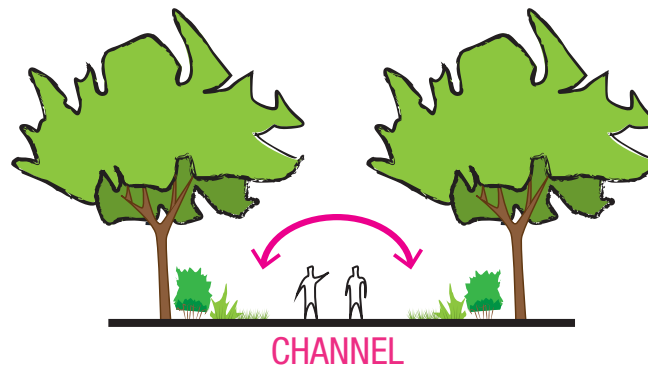
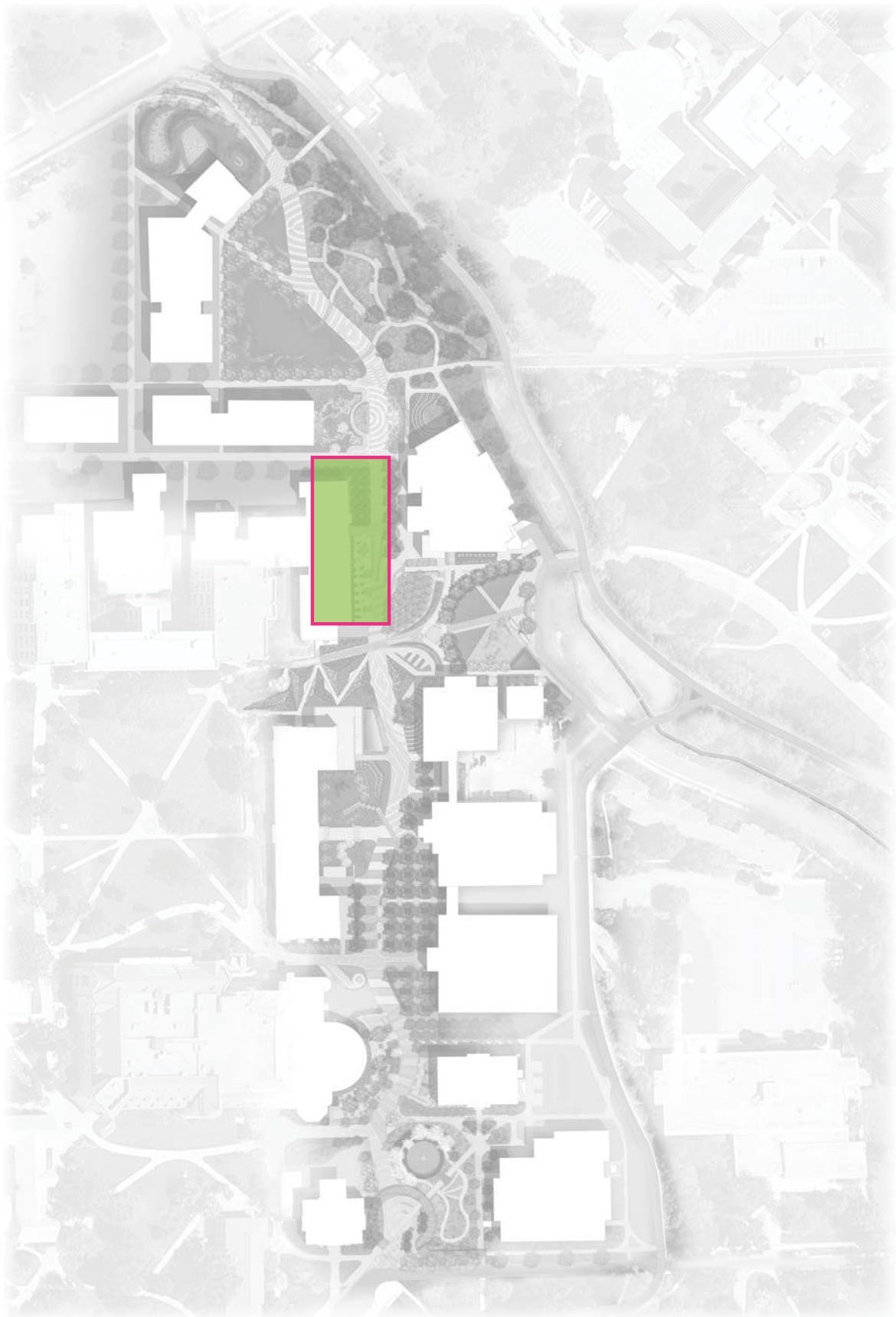


Figure 6.67 (Above) Spatial Archetype 7 | By Author

Figure 6.68 (Facing Page) Key Plan 7 | By Author



## RESTORATIVE APPLICATION WITHIN SPACE

The orchard has been programmed into what was once an open lawn with no function associated with it. The small, linear space fronts all of the grain sciences and industry building to once again make the connection between architecture and landscape more apparent. A key design consideration in developing this space was the visibility and comfort of users both passing by and occupying the orchard. The raised planter beds define small subspaces that allows easy access to gardeners of all skill levels. Paving patterns based on the shared geometries between the armatures of the theater and raised planter beds help draw potential users into the space. An allée of fruit and nut bearing trees provides comfort by shading several benches at the North end of this space. Lastly, a naive rain garden defines the edges between the garden street and sunken spaces adjacent to the Leadership Studies Building.

## LEGEND: ACTIVE/RESTORATIVE FEATURES

- ① RAISED PRODUCTION GARDEN BEDS
- ② HERB SENSORY GARDEN
- ③ FRUIT & NUT BEARING TREE ORCHARD
- ④ NATIVE RAIN GARDEN
- ⑤ DYNAMIC PAVING PATTERN UNITES SPACES



**SECTION GG**

Figure 6.69 (Above) Site Section GG | By Author

Figure 6.70 (Facing Page) Illustrative Plan 7 | By Author







# THE TRIBUTARY

## DESIGN NARRATIVE

The tributary synthesizes the restorative benefits associated with the lowland and channel archetypes and envelops users within the setting of a native stream channel with turbulent waters. This space allows users to submerge themselves below the level of the main circulation path and view an idealized prairie scene. Tiered amphitheater style seating permits individuals or groups of all sizes to relax and relieve stress within this space. An existing outdoor classroom on the East side of the main pedestrian spine has been improved through inclusion of spatially enclosing vegetation. A platform with several low seating walls, wildflower plantings, and pop jet fountains allows passersby to investigate and potentially join outdoor lectures that may be of interest to them. Overall, this space acts as a transition between the very structured and refined geometric spaces to the south and the more naturalized and organic spaces to the North.

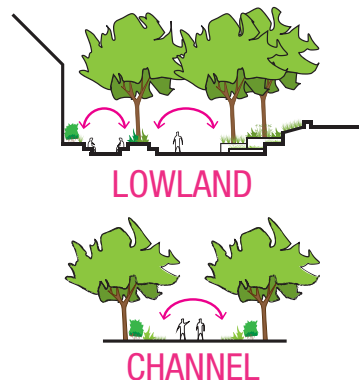


Figure 6.71 (Above) Spatial Archetype 8 | By Author

Figure 6.72 (Facing Page) Key Plan 8 | By Author

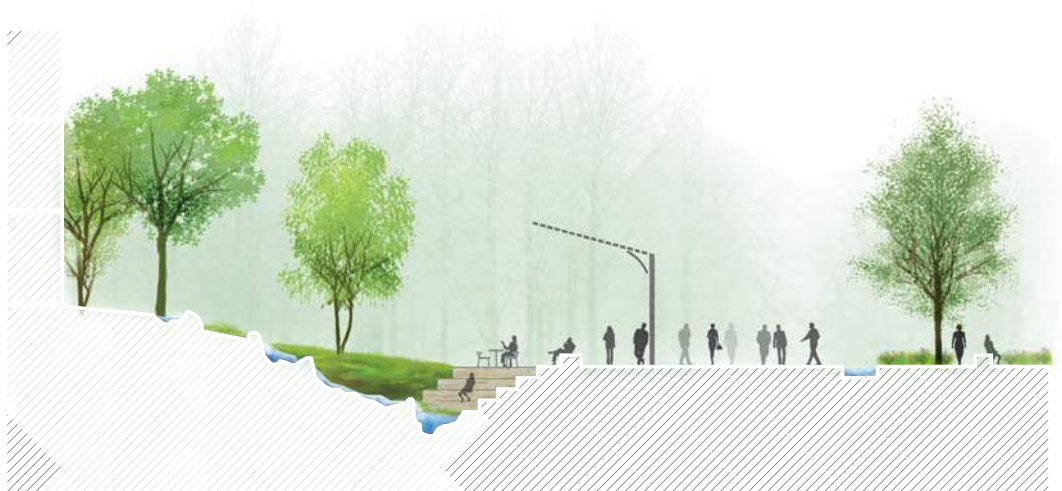


## RESTORATIVE APPLICATION WITHIN SPACE

The sunken nature of this space provides a quiet environment of reflection for students and increases the sense of being away described in the literature review. By enveloping users within a natural scene, stress from the outside world will quickly fade away. The space, much like a Japanese meditation garden, is not meant to be occupied. Rather, it is meant to be viewed, appreciated, and understood from the edges. A viewing platform and adjacent amphitheater style seating encourage this passive engagement with the space. As the space is located adjacent to a major intersection with a crossing pedestrian route, it is intended to act as a brief restorative focal point for students quickly passing across the space.

## LEGEND: ACTIVE/RESTORATIVE FEATURES

- ① ARTIFICIAL STREAM RECYCLES STORMWATER
- ② AMPHITHEATER ALLOWS OUTDOOR CLASSES
- ③ OVERHEAD SHADE STRUCTURE
- ④ TIERED MONOLITHIC SEATING
- ⑤ SEATING NOOKS
- ⑥ ORNAMENTAL SENSORY APPEALING PLANTING

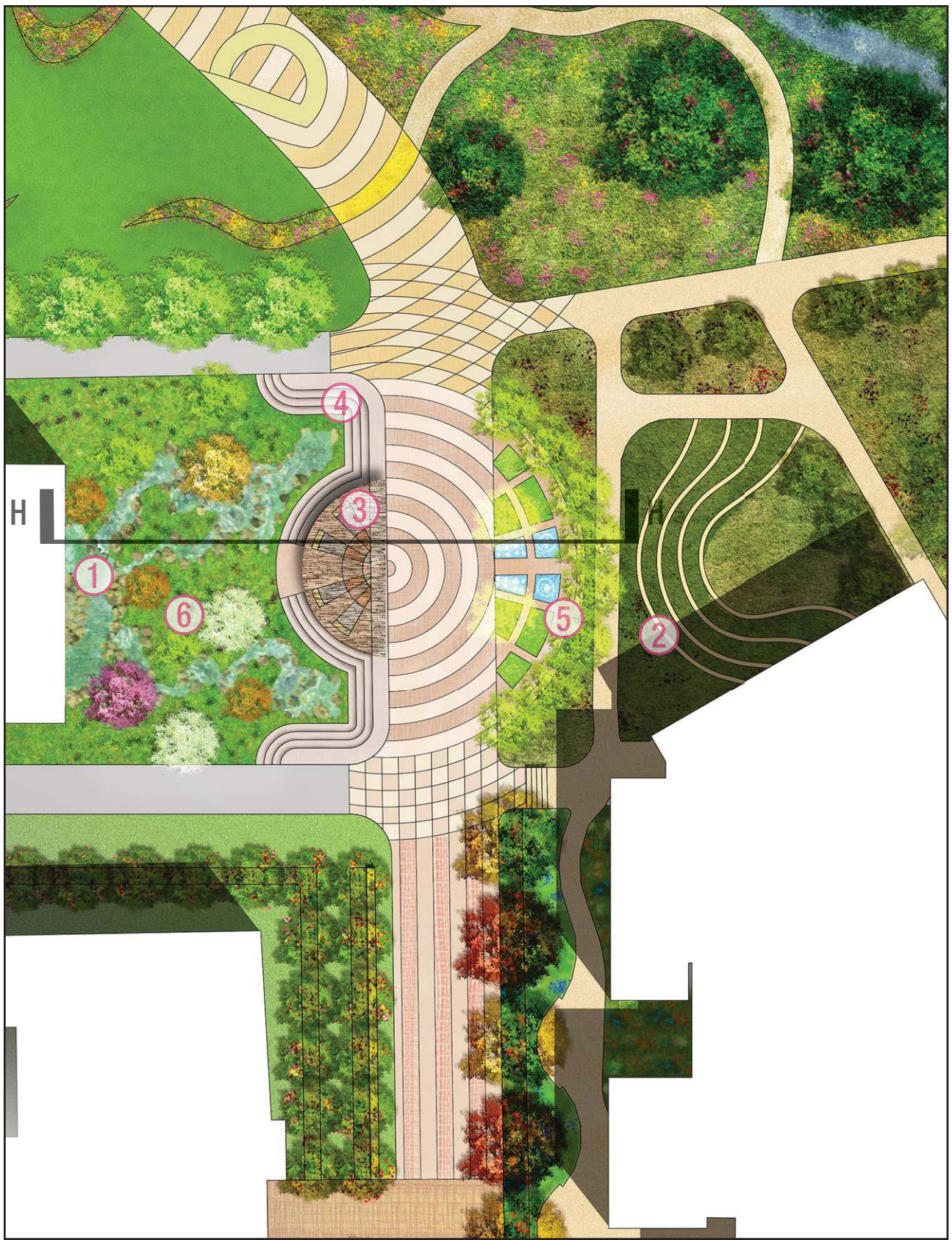


**SECTION HH**

Figure 6.73 (Above) Site Section HH | By Author

Figure 6.74 (Facing Page) Illustrative Plan 8 | By Author







# THE PRAIRIE

## DESIGN NARRATIVE

At the corridor's intersection with the existing Campus Creek channel, the prairie emerges as a re-discovered native landscape within the Kansas State University campus. Much of the historical tallgrass prairie landscape associated with the Flint Hills surrounding the city and campus has been replaced by turf grass, resulting in a loss of connection between the campus and its context. The prairie creates a poetic, wild, and seemingly uncontained native environment that allows students to wander along meandering trails at their own pace. Restoration of the course of Campus Creek through this space allows it to become an aesthetic amenity rather than simply a flooding nuisance. On the West side of the main circulation spine a more traditional quadrangle space has been appropriated to allow students to engage in recreational activities within the nature filled space. Threads of native prairie perforate the formal quadrangle to unite the spaces.

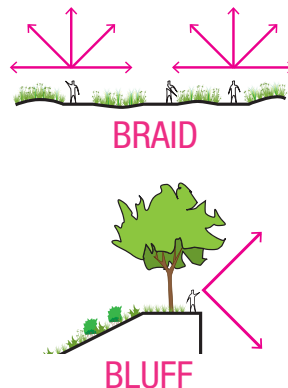


Figure 6.75 (Above) Spatial Archetype 9 | By Author

Figure 6.76 (Facing Page) Key Plan 9 | By Author



0 125 250 500 Feet



## RESTORATIVE APPLICATION WITHIN SPACE

Exploration is a key experiential factor to consider in creation of a restorative environment. The addition of a braided, winding series of trails along Campus Creek allows students to explore the visually complex and mysterious riparian corridor. Fascination within the native prairie is achieved due to the multi-sensory planting palette and ability of native vegetation to attract wildlife. The meandering paths constantly re-frame users and evoke a sense of mystery. Solidarity of movement through the winding trails creates an introspective experience for students, allowing time for reflection and regeneration of directed attention. Intimate seating nooks scattered along these pathways allow users to rest and spend time viewing the native scene. The unprogrammed lawn represents a legible space that is very familiar to nearly all students, allowing it to be understood quickly and utilized for a wide variety of recreational and social activities.

## LEGEND: ACTIVE/RESTORATIVE FEATURES

- ① SEATING NOOKS ALONG PATH
- ② UNPROGRAMMED, FLEXIBLE LAWN
- ③ NATIVE PRAIRIE SWATHS PIERCE TURF GRASS
- ④ NATURALIZED PRAIRIE TRAIL
- ⑤ RESTORED, STABILIZED CAMPUS CREEK
- ⑥ SEPARATED BIDIRECTIONAL BICYCLE LANE
- ⑦ TREES CLEARLY DEFINE OPEN LAWN EXTENT
- ⑧ NATIVE GRASSES AND WILDFLOWERS



### SECTION II

Figure 6.77 (Above) Site Section II | By Author

Figure 6.78 (Facing Page) Illustrative Plan 9 | By Author





Feet







Figure 6.79 (Above) Bicyclists Ride Past Naturalized Creek And Trails | By Author





# THE GYM

## DESIGN NARRATIVE

As the final terminating space on the North end of the garden street's winding path, the gym represents the most balanced merger of mental and physical health promoting design strategies. As Claflin Road is one of the most chaotic and hectic corridors on campus, this space had to provide restoration through a very different approach. In order to screen views from the street and reduce the amount of noise pollution, a series of crescent shaped vegetated berms grow out of the building mass and subdivide the terminus into two gathering spaces. The first of these spaces is then populated with outdoor recreation and workout equipment to allow students opportunity to promote their own physical health in a structured manner within a natural scene. The second space is paired with an elevated stage and left almost entirely unprogrammed to allow group fitness classes including yoga, pilates, karate, and many other to be organized within the space.

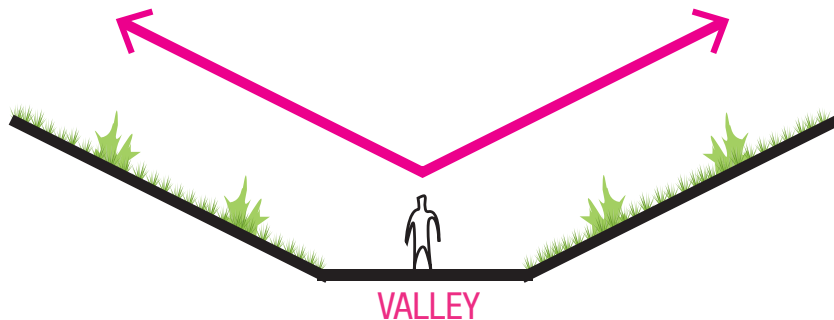
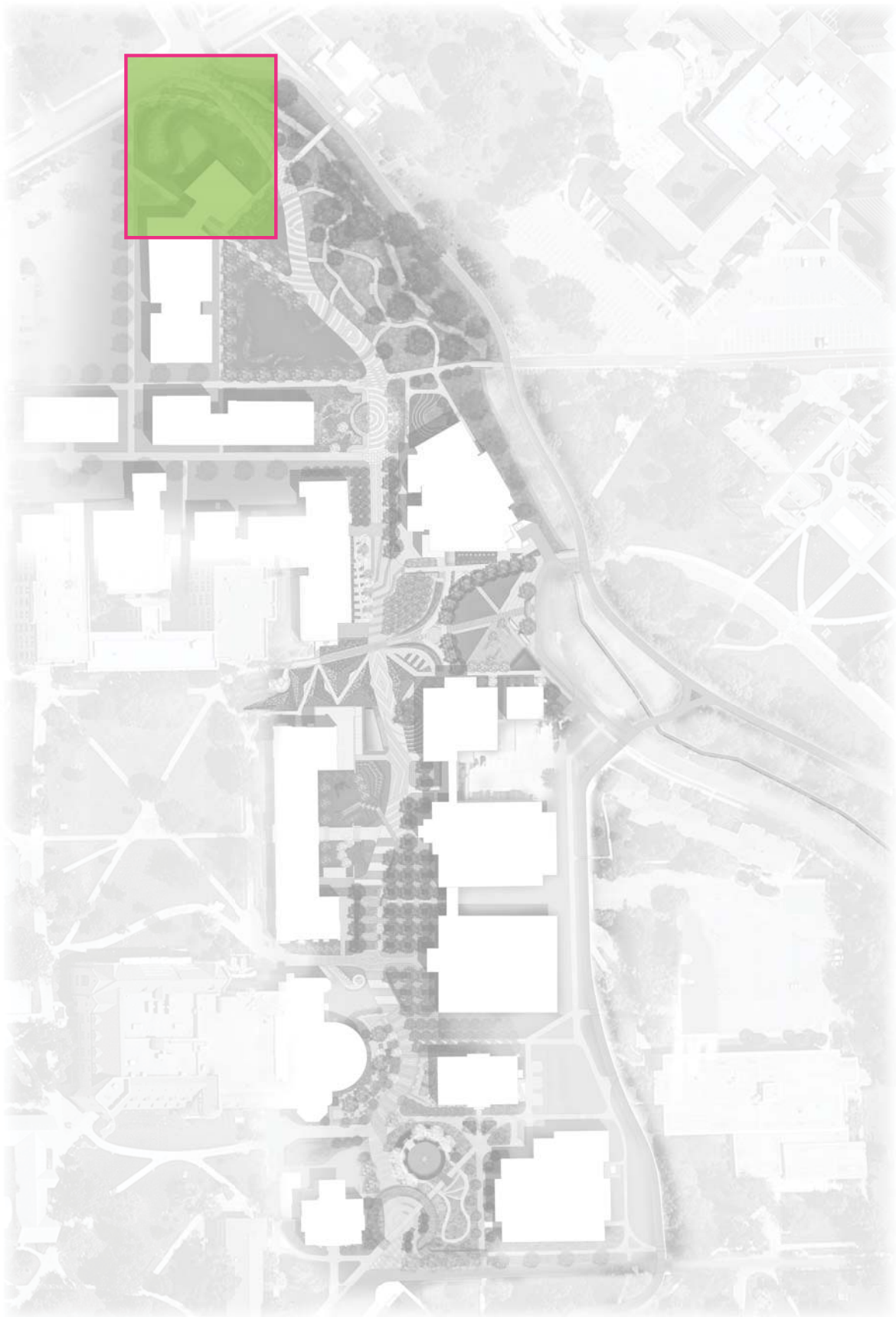


Figure 6.80 (Above) Spatial Archetype 10 | By Author

Figure 6.81 (Facing Page) Key Plan 10 | By Author







## RESTORATIVE APPLICATION WITHIN SPACE

The vegetated berms laid out within the gym prevent users of the space from feeling like they are being watched as they participate in physical activity. The structured physical activity space allows students jogging or bicycling through campus as a form of recreation to make a quick pit stop to get some lifting in without ever leaving the core of campus. The moderating effect identified between physical and mental health is vital to the success of this space. The berms within the gym are scaled to comfortably respond to the human dimension and densely planted with highly sensory appealing plant material so that users of the space feel as if they've left the campus and been transformed to an entirely new environment. The unstructured fitness space can be rented by student organizations, clubs, or simply used by individuals as they see fit. Lastly, the intimate space shaped by a lone berm allows users to meditate and reflect in solitude.

## LEGEND: ACTIVE/RESTORATIVE FEATURES

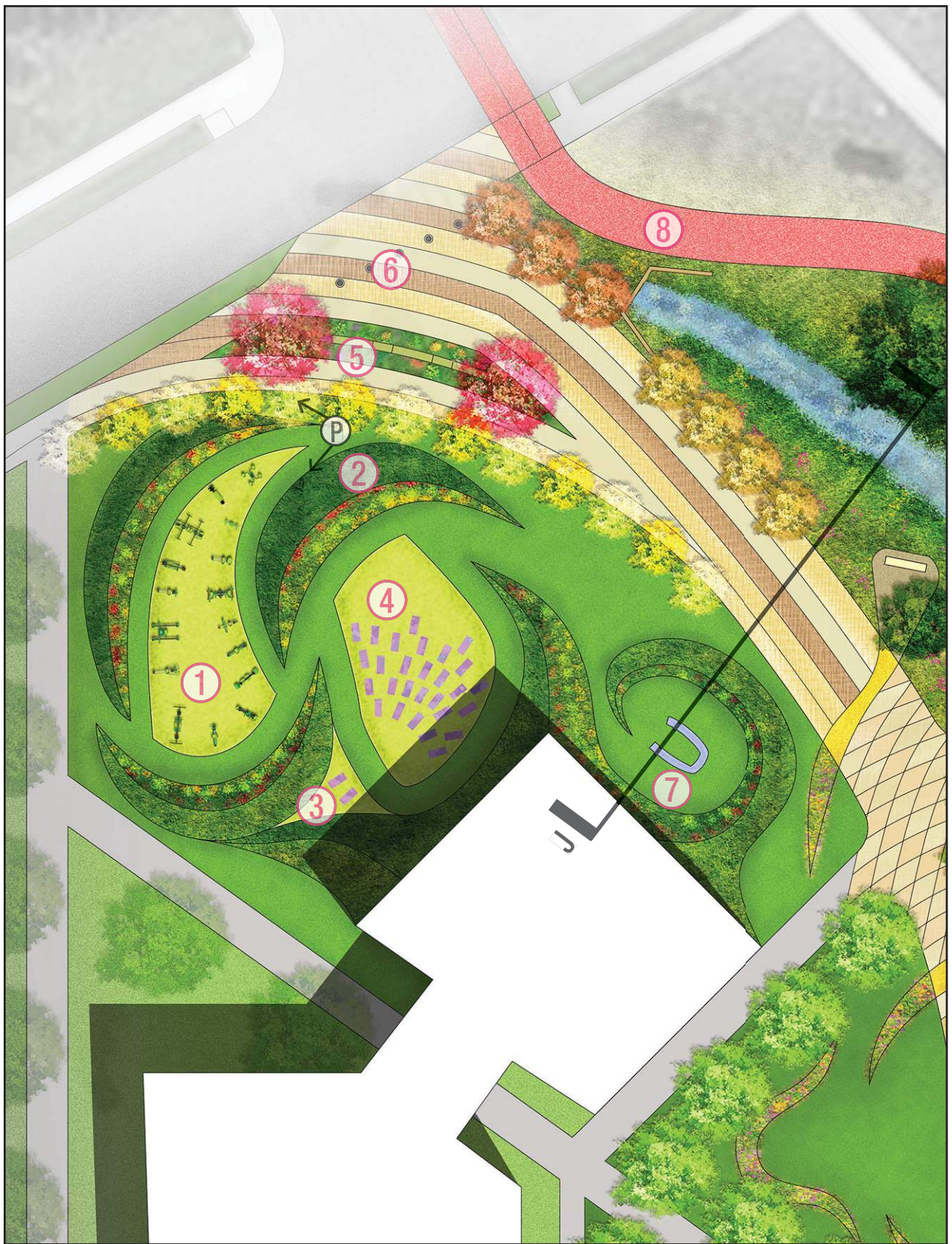
- ① STRUCTURED WORKOUT ZONE
- ② DENSE, SENSORY ENGAGING BERM
- ③ ELEVATED PLATFORM FOR FITNESS LEADER
- ④ UNSTRUCTURED, FLEXIBLE FITNESS SPACE
- ⑤ ENTRY GATEWAY AND SIGN FEATURE
- ⑥ OPERABLE BOLLARDS
- ⑦ MEDITATION SPACE AND POOL
- ⑧ SEPARATED BIDIRECTIONAL BICYCLE PATH



**SECTION JJ**

Figure 6.82 (Above) Site Section JJ | By Author

Figure 6.83 (Facing Page) Illustrative Plan 10 | By Author



0 25 37.50 75 Feet







Figure 6.84 (Above) Outdoor Recreation Space Sheltered By Landform | By Author











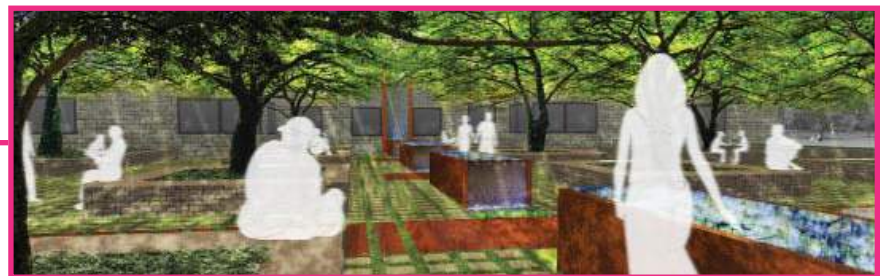


Figure 6.85 (Above) Spatial Character Along The Mid-Campus Garden Street | By Author



# CHAPTER SUMMARY

The three scales of design described in depth within this chapter are informed by synthesis of the findings from literature review, case study analysis, site analysis, and survey responses. By applying the conceptual and practical knowledge organized within the restorative and active frameworks established in Chapter 4, a unique and visionary solution to promote students mental and physical health within the campus street environment has been crafted. The planning and design decisions made at the campus, corridor, and site scales are grounded in the previously defined design goals of creating “a calm, social, and attractive human scale environment to encourage walking and bicycling within the university campus” and “a corridor with a variety of intimate gardens and social spaces that provide restoration to students inhabiting and circulating through the space.” Each scale of design responded individually to key active and restorative themes in order to collectively shape a mentally restorative and

physically active campus garden street. While the application of the restorative and active design frameworks has been applied specifically to the case of Kansas State University’s campus, it is important to note that the design strategies, considerations, and approaches described throughout this document can be applied to any university campus environment. The site analysis and survey section of the project represent the only research methods which are exclusive to the Kansas State University case and have been described in depth so that they can be emulated within other university campus environments. Overall, application of the fundamentally different design considerations required to shape a *restorative* and *active* campus garden street have produced a visionary experience unlike any other within the university campus environment. Increased spatial programming, aesthetic delight, restorative qualities, and active transportation affordances allow this design proposal to emerge as truly unique and meaningful to students.

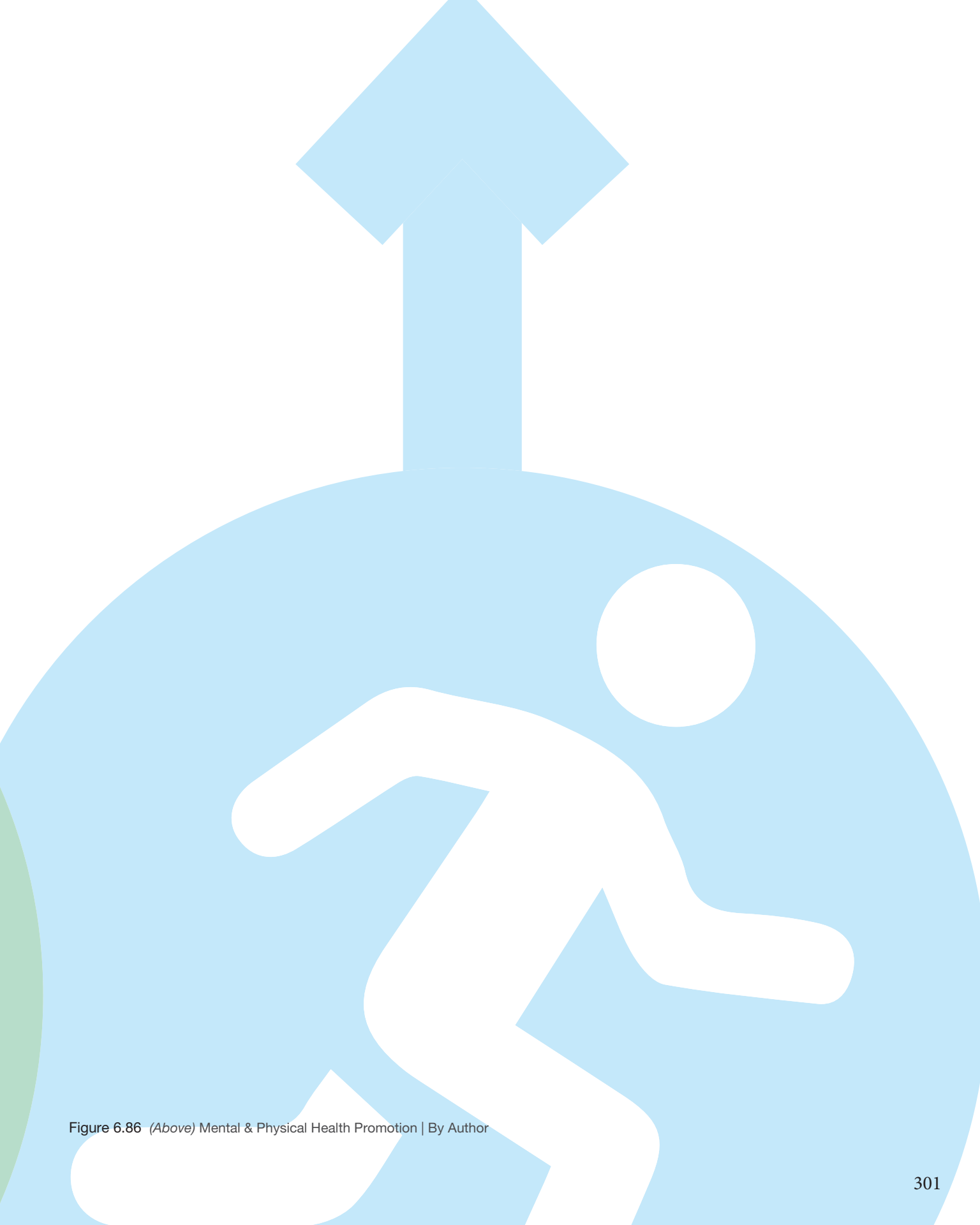


Figure 6.86 (Above) Mental & Physical Health Promotion | By Author

07



## CONCLUSION

The final chapter of this report summarizes the overall scope of the project and provides final considerations from the author. Reflections on the project methodology, findings, and design outcomes are discussed in depth within this chapter. Concluding thoughts regarding the limitations of the project and its future application in both a design and research setting are presented. Overall, the connections between research, design, and project execution influence these final reflections and thoughts.

# PROJECT RESULTS & DISCUSSION

## RESEARCH FINDINGS

While humans have coexisted with and relied heavily on our relationships with nature over thousand of years of evolution and development, the societal development and design patterns which have taken place over the past century have increasingly reduced human interaction with nature. As the automobile became increasingly available to the masses in the early 20th century, development patterns shifted drastically to responds to the spatial needs of the automobile rather than the pedestrian, carriage, bicycle, or horse. Spaces designed for the automobile often lacked any considerations or features to allow meaningful development of a human experience. Campus design post World War II reflects these societal trends as humans increasingly relied on automobiles as a form of transportation. Campus planning considerations shifted to provision of infrastructure to allow increased vehicular accessibility at the expense of the human scale experience. A recent trend in campus design involving reclamation of vehicular thoroughfares for pedestrian usage sparked further investigation into the function of connective linear tissue within the campus fabric. Research into campus design resulted in identification of the power of placemaking to provide meaning and structure to all of the parts within the collective whole of a university campus.

During initial examination of the ability of designed landscapes to provide mental restoration to inhabitants, the author held

significant doubts related to the ability of a prescribed framework to shape the design of a particularly restorative space. How could a space be designed to be more mentally restorative than another potential solution? If interaction with nature is the primary determinant for restorative potential within a given environment, how could one determine the spatial characteristics and specific programmatic elements that are conducive to a highly restorative experience? Furthermore, how can one argue that a given space provides more mental restoration to a user compared with another space with different structure and spatial characteristics?

However, these preliminary doubts and questions were answered through comprehensive literature review and case study analysis of several award winning restorative landscapes. Through synthesis of findings extracted from these research methods and development of a framework to inform the design of restorative landscapes, it became readily apparent that the answers did not lie in any sort of specific copy paste design toolkit or quantitative analysis of spatial programming. The answer was to be found by seeking out an understanding of the human experience within a given space through tactile relationships with specific program elements that are organized based on several key conceptual theories of restoration and phenomenology. Synthesis of the key theories and concepts through literature review resulted in the identification of six principal themes relevant to the design of a restorative landscape. These themes include:

- 1) Nature + Stimulation
- 2) Movement + Control
- 3) Richness + Variety
- 4) Introspective + Personal
- 5) Social + Communal
- 6) Familiarity + Suitability

The review of literature from several related disciplines including environmental psychology, sociology, anthropology, and horticulture proved to be highly influential in developing a focused approach to research and design. Initial identification of the relationship between the built environment and health behaviors and outcomes was pivotal to investigation into specific built environment changes to initiate human response. Additionally, the identification of a significant moderating effect between physical activity and mental health allowed a conceptual bridge to be constructed between findings from both the active and restorative realms. The foundational theories that support the mental health outcomes of restorative landscape design allowed legible organization of previously random collections of design application findings.

In order to translate the conceptual finding to a physical design solution, several successful cases of restorative landscape design were examined. Key design considerations and programmatic elements that related to each of these six categories were extracted and identified within a matrix to inform a future designed solution. These tactile elements alone do not provide any sort of restorative experience. However, when

united and organized through the six theme lenses identified through literature review, the program element can foster the creation of a mentally restorative environment.

Investigation into the built environment's impact on an individual's choice of transportation mode was based primarily in identification of physical design features and changes to a given built environment that encourage active transportation. These findings revolved around provision of an increased amount of walking and bicycling infrastructure, closure of vehicular routes, and increased safety within the built environment. Five key themes were derived from literature review and case study analysis including:

- 1) Multi-Behavioral Affordances
- 2) Traffic Safety
- 3) Aesthetic Improvements
- 4) Human Scale
- 5) Socially Engaging

Ultimately, the connections between the seemingly unrelated considerations for creation of restorative landscapes and active transportation promoting environments were justified through identification of a moderating effect between physical health and mental health. Essentially, increased physical activity and health is related to increased mental functioning and health and vice versa. These linkages between two forms of wellbeing provided a foundation for connection of the juxtaposed research investigations in a design solution.



## DESIGN OUTCOMES

By applying the research findings through a designed solution, a much higher degree of understanding related to the requirements and inherent connections of active and restorative landscape design was achieved. The creation of two related formal design frameworks within this work was invaluable to the translation the research findings to tactile design solutions. The role of specificity in scale within the design application of this project cannot be overstated as an organizational technique. Recognition that the design considerations for active transportation and restorative landscape design must occur at several interrelated and nested scales greatly simplified the design process and provided a tool to more easily correlate the restorative and active transportation based improvements within the campus environment. Application of design at these three scales allows a university to examine a wide range of potential improvement to its campus in order to shape a more mentally and physically healthy landscape. The design application within Kansas State University challenges campus planners, landscape architects, and architects alike to think more creatively about the potential functions that various campus spaces can provide. Clearly, this project is completed in the vacuum of academia without financial and political constraints, however, the point remains true. By challenging designers to dedicate more thought to the mental and physical health implications of each of their design decisions, the university campus environment can potentially become a

fertile ground for promotion of physically and mentally healthy behaviors.

The final, designed outcome of this project and report provides an illustrative example of the systematic process through which mental and physical health can be promoted within the student body. It is important to note however that the application of the design framework to the specific case of Kansas State University's campus is intended only to provide an example of its potential to incite positive change within a campus environment. The framework is intentionally generalized to all campus environments so that any university can examine this document and investigate the relevance of these design consideration to promote their student body's mental and physical health within their own campus environment. By applying the analysis, investigation, programming, and design strategies identified within this report, a wide variety of university campuses can better promote students' mental and physical health.

The design provides a substantial amount of new opportunities for students to interact with nature in a meaningful way by carefully considering the human response to all proposed design changes. By increasing opportunities for student socialization, students will find themselves inhabiting the campus much more often throughout the day to meet up with friends, study, or simply relax. Another opportunity provided by this design solution involves the ability to draw new students to Kansas State University based on the increased

aesthetic appeal within the campus core. By providing spaces adjacent to each building that responds to the programmatic and functional needs of the departments within that building, the lines between architecture and landscape can be blurred. Additionally, when implemented it provides opportunities for research into the specific mental health outcomes associates with various archetypes of restorative spaces.

A major constraint of the design solution comes from the requirements for continued emergency access within the corridor. The requirement for 26 feet of uninterrupted access width severely limited the restorative potential of the primary pedestrian thoroughfare. If a more sinuous, braided pattern of circulation with interstitial landscaped spaces could have been explored, mental restoration would have likely increased. The campus scale design proposals related to infrastructural improvements are constrained in that further investigation into the connections between the surrounding urban fabric and the campus are required. It is shortsighted to assume that by simply providing infrastructural improvements within the campus boundary, active commuting behaviors will increase. If students do not feel safe and comfortable during their commute to the campus boundary, the degree of safety and comfort they encounter within the campus is irrelevant. Lastly, a significant constraint of the design came from balancing the long term vision associated with recommending massive campus changes such as new building masses and street closures with realistic design expectations that could be

applied in a real world scenario. More thought could have been given to the structured phasing of this project in order to illustrate how the campus should evolve through time based on financial and political constraints.

## **PROJECT LIMITATIONS**

Time was the most limiting factor in the completion of this project. The integrated research and design methodology undertaken to accomplish the research objectives outline in Chapter 1 of this report was defined largely based on the time frame allowed to students for project completion. However, even based on the constraints provided by time, the project was successful in providing relevant and meaningful answers to its original research questions. Several ways in which the project was limited and could have been more comprehensively completed are described below.

One of the primary limitations of the study is related to the ability of a design solution which is very specific to the project site within Kansas State University's campus to be generalized as a case and applied to other universities. A more carefully structured investigation and description of the ways that design solutions can be translated to various environments would have provided increased relevance to the project.

The survey completed by 181 current students at Kansas State University was certainly helpful in the evolution of the project's findings and

design applications. However, it could have been more focused on the specific behavioral health patterns and built environment preferences of students to allow more meaningful findings to be applied to a final design solution. The survey would have ideally asked students to respond to a series of images illustrating various restorative and non restorative landscapes to identify spatial preferences. Additionally, illustrations of environments that contain various degrees of bicycling and walking infrastructure could have been presented to students to identify the most suitable environment to promote active transportation. A larger sample size would have allowed collection of more relevant and meaningful findings. Lastly, much more time would be allocated to the systematic analysis of survey data to draw further conclusions about the unique case of the student body at Kansas State University. The survey performed by the author was rich with potential data, however time limited the extraction of findings from the survey responses. Increased survey validation should be performed to ensure the integrity of data and findings extracted from the survey results.

The analysis of built cases of restorative landscapes and active environments undertaken within the research methodology of this project was severely limited to investigation of online resources, magazine articles, publications, photographs, and phone conversations with designers. In order to more appropriately analyze cases of built work, site visits are necessary. In future projects, all cases of built

works should be analyzed in person through sketching, note taking, photography, mapping, and diagramming. Only a limited amount of information can be extracted from project briefs, photographs, and satellite imagery. Key experiential quantities of the cases analyzed within this project and report may have been overlooked based on the lack of funding to provide access to these built works. Ideally, more cases would have been analyzed to draw more findings related to the arrangement of program elements to shape meaningful human experience within a built environment.

Another research strategy that may have proven very fruitful for extraction of illuminating analysis information is site observation. Structured experiential site mapping, ethnographic fieldwork, pedestrian/bicyclist/vehicle counts, and time lapse photography may have led to unforeseen findings that could significantly alter the path of the project. Systematic observation of student use of key nodes, paths, and spaces within the campus fabric should be provided to better understand how the spaces function in their current form. A distinct lack of design collaboration with students at the university means that the final design solution illustrated within Chapter 6 of this report only represents the author's interpretation of research and site analysis findings. By involving students in the design process through a series of structured and informal programming and design generation charrettes, the final product may have been more reflective of the needs and desires of the



general student body at Kansas State University. If the final design solution had been generated earlier on in the semester, it would have been productive to present the planning and design solutions developed by the author in front of an unbiased and randomly selected panel of students representing different age ranges, colleges, and residency status. The author did however employ the assistance of several fellow landscape architecture colleagues and classmates throughout the program and design development stages of the project in order to maximize creative design generation.

While the project initially sought to provide a balanced research/design approach to promotion of mental and physical health, the mental health benefits associated with exposure to restorative settings clearly emerged as the primary focus of the project during both the research and design stages. The nested scales of design provides a relative degree of connection between these two different approaches to planning and design. However, much more detail was applied to the design application of restorative landscapes in comparison to physically active spaces. Ideally, by establishing equal levels of attention to both realms of the project's investigation, the final designed product would display more interaction and interplay between restorative landscape and active transportation infrastructure.

Another important group that should have been more involved in the research, programming, and design phases of this project is key stakeholder

representing both the university and the student body. An interview with Ryan Swanson, the Kansas State University Architect and Associate Vice President of Facilities was very enlightening and provided key background information related to ongoing university projects, budgets, and timelines. By involving more university representatives including student government leaders, facilities managers, and decision makers the project may have been more grounded in the realities of campus politics for better or worse. This feedback and involvement may have potentially changed the interest in investment in ongoing street corridor redevelopment plans described within Chapter 5 of this document. The design solution created at three scales by the author of this report represents the personal synthesis and application of research findings of one individual with guidance from several committee members and is in no way representative of the perfect solution. Rather, it illustrates one potential solution within the Kansas State University campus in order to start further conversations about the campus' future.

Lastly, a key missing feature of the study is an evaluation of the design proposal based on the research which supported its creation. The impact of the design should have been explored in a much more structured manner in order to properly justify the potential of the proposed changes to promote students' mental and physical health. In future investigations, this design evaluation will allow readers to quickly understand the resulting impact of each design decision as it relates to the greater project goals.

## FUTURE RESEARCH

To take the work completed throughout the course of the Spring on 2015 to a higher level of realism and potential application, I've planned a follow up visit with the University Architect to discuss the major research and design outcomes of this project and explain their relevance to the future development of the campus through time. While the likelihood that many design decisions become implemented within the university campus is very slim, planting the seed of an idea within the university's administration and planning members may prove to be beneficial in the long term. As Kansas State University looks towards its goals of becoming a top 50 public research institution by 2025, this type of landscape overhaul would provide a learning laboratory for study of the restorative effects of designed landscapes on university students within a campus environment.

Temporary street closures can be planned and studied to test the effectiveness of campus street closure to vehicular traffic on active transportation behaviors among the student body. Events such as PARKing day can serve as inspiration for the reclamation of vehicular dominated spaces within the campus core. Interviews with students passing through these spaces may provide enlightening findings related to the effectiveness of these street closures.

There is currently a need to more fully understand the relationship between circulation functionality and restorative character of a space.

A study examining the relationship between varying sizes of crowds moving through a natural space and user's restoration is important to determine whether a restorative series of spaces would be effective adjacent to a major pedestrian circulation route within a university campus. The restorative potential of such a space may in fact be much more limited than the assumptions taken within this project. More research needs to be completed in order to fully understand what types of environments evoke stress and anxiety within a given population sample in order to more clearly define areas for improvement within the campus environment.

As this project was explored through the lens of landscape architecture, its scope and impact was limited to the proficiency of a landscape architect. By applying a more interdisciplinary approach through collaboration with other departments and selection of committee members outside of the College of Architecture Planning & Design, a richer solution may have been achieved.

Students' movement patterns within this project were generally extrapolated based on the most frequented buildings, circulation hierarchy, and campus density. A comprehensive network analysis of students walking, bicycling, and driving behaviors would provide much more meaningful data to apply to the design of active transportation infrastructure within the campus environment. By connecting students' home addresses with several common destinations within the campus, key access nodes and a

points of conflict could be clearly identified. Additionally, areas of the campus missing infrastructure to support active movement could be more easily identified based on this analysis. Lastly, more evidence based design studies related to improving users mental and physical health need to be completed within a variety of different contexts. Design should support human health and wellbeing at the bare minimum.

## **PROJECT IMPLICATIONS**

This project begins to bring knowledge from a variety of different backgrounds and disciplines to better understand how campus street design can promote the mental and physical health of college students. The project's dilemma, stemming from the drastically decreasing mental and physical health of students, is a major concern looking to the future of campus planning and design. The project gains national relevance introducing many of the shared dilemmas between university campuses across the country and describing how these dilemmas can be mitigated through a focused research and design approach based on promotion of mental and physical health within the student body. By potentially increasing the health and general wellbeing of its students, a campus will likely see increased academic performance, higher graduation rates, more engaged and socially active students, and a higher degree of interest from high school students who value the aesthetic character of the university campus. Overall, by structuring all future planning

and design decisions within the campus environment around the research support design frameworks identified within this body of work, any university can positively impact the mental and physical health of its student body.



# CONCLUSIONS

## PROJECT AND PROCESS REFLECTION

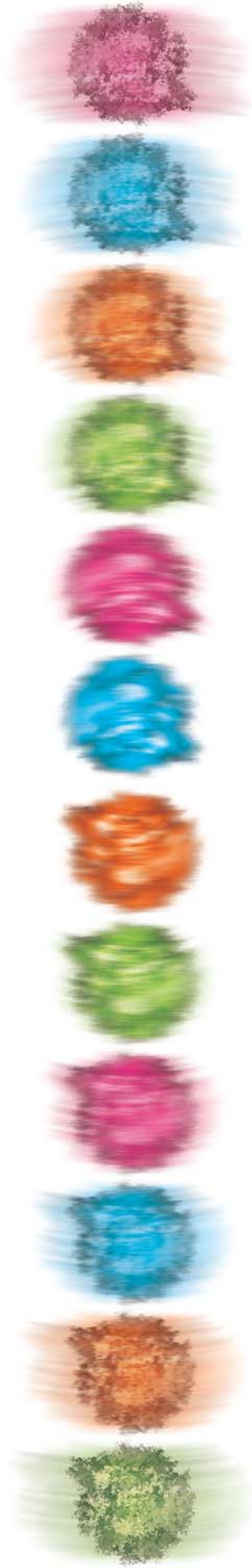
The methodology employed throughout the course of this project has informed the creation of a successful design solution to promote students' mental and physical health within the Kansas State University campus. The qualitative and quantitative methods undertaken to arrive at this solution are grounded in comprehensive research investigation through literature review, case study analysis, survey analysis, typology creation, site analysis, and ultimately - design. The project has made the case through evidence based design for a reformed campus environment in which the mental and physical health of the student rules supreme over design decisions, further resulting in an aesthetically pleasing, dynamic, and functional campus environment.

As millions of students are enrolled in college within the United States, the concerns with dramatically decreasing mental and physical health among the student body are very relevant. By attacking this problem through changes to the built environment, the need for counseling services, medication, and support services to promote mental health may be drastically decreased within university campuses. Additionally, by establishing active transportation habits into college graduates who will be future leaders, politicians, and decision makers, a great deal of future benefits relating to investment in active transportation promoting infrastructure and systems may follow. The college student represents a flexible demographic

that is often eager to socialize, recreate, and engage in his/her physical surroundings. The identification of a current trend towards closure of campus streets as a tool to investigate a unique design solution provided many opportunities to rethink the multitude of ways that students use the campus. By reshaping the campus, the environment which college students spend the majority of their time within, a series of mental and physical behavioral changes may soon follow suit.

Overall, as a student who has experienced previously unimaginable amounts of stress, mental health difficulties, and physical health issues throughout the course of the past semester, I can personally vouch for my belief in the importance of shaping built environment changes catered to promotion of students' mental and physical health.

Figure 7.1 (Facing Page) Active Restoration | By Author



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Figure 4.13

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Figure 4.15

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Figure 5.11

DeVault, J. (Cartographer). (2015). *Elevation Map of Kansas State University* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.12

DeVault, J. (Cartographer). (2015). *Slope Map of Kansas State University* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.13

DeVault, J. (Cartographer). (2015). *Most Frequently Visited Buildings On Campus* [Map]. from: ArcGIS, ArcScene, & Adobe Illustrator

Figure 5.14

DeVault, J. (Cartographer). (2015). *Kansas State University Bicycle Infrastructure* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.15

DeVault, J. (Cartographer). (2015). *Kansas State University Pedestrian Infrastructure* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.16

DeVault, J. (Cartographer). (2015). *Core Campus Boundary* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.17

DeVault, J. (Cartographer). (2015). *Core Campus Gateways* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.18

DeVault, J. (Cartographer). (2015). *Pedestrian Circulation Hierarchy* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.19

DeVault, J. (Cartographer). (2015). *Core Campus Green Space* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.20

DeVault, J. (Cartographer). (2015). *Core Campus Streets & Parking* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.21

DeVault, J. (Cartographer). (2015). *Pedestrian/Vehicle Crash Frequency* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.22

DeVault, J. (Cartographer). (2015). *Bicyclist/Vehicle Crash Frequency* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.23

DeVault, J. (Cartographer). (2015). *Stress And Anxiety Inducing Outdoor Spaces* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.24

DeVault, J. (Cartographer). (2015). *Least Used Campus Streets* [Map]. from: Adobe Illustrator

Figure 5.25

DeVault, J. (Cartographer). (2015). *Site Analysis Synthesis* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.26

DeVault, J. (Cartographer). (2015). *Corridor Scale Analysis/Design Limits* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.27

DeVault, J. (Cartographer). (2015). *Corridor Scale Topographic Relief* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.28

DeVault, J. (Cartographer). (2015). *Corridor Scale Pedestrian Network* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.29

DeVault, J. (Cartographer). (2015). *Corridor Scale Bicycle Network* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.30

DeVault, J. (Cartographer). (2015). *Corridor Scale Vehicular Network* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.31

DeVault, J. (Cartographer). (2015). *Corridor Restoration Potential* [Map]. from: ArcGIS & Adobe Photoshop

Figure 5.32

DeVault, J. (Creator). (2015). *Corridor Photography Key Map* [Diagram]. from: ArcGIS & Adobe Illustrator

Figure 5.33

DeVault, J. (Photographer). (2015). *Intersection Alignment Causes Confusion* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.34

DeVault, J. (Photographer). (2015). *Long Crossing Distances Deter Walking* [Photograph], Retrieved March 17, 2015,

from: Author's Collection

Figure 5.35

DeVault, J. (Photographer). (2015). *Gathering Space Allows Socialization* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.36

DeVault, J. (Photographer). (2015). *Parking Lot Is An Eyesore To Passersby* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.37

DeVault, J. (Photographer). (2015). *Corridor Dominated By Vehicular Access* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.38

DeVault, J. (Photographer). (2015). *Wall Acts As Barrier To Willard Hall* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.39

DeVault, J. (Photographer). (2015). *Arts Terrace Lacks Functionality* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.40

DeVault, J. (Photographer). (2015). *Infrastructure Interrupts Views To Quad* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.41

DeVault, J. (Photographer). (2015). *Bicycles Share Street Space With Vehicles* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.42

DeVault, J. (Photographer). (2015). *Street Dominates Pedestrian Experience* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.43

DeVault, J. (Photographer). (2015). *Amphitheater Allows Outdoor Classes* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.44

DeVault, J. (Photographer). (2015). *No Separation Between Street & Sidewalk* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.45

DeVault, J. (Photographer). (2015). *Cut Banks Within Degraded Campus Creek* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.46

DeVault, J. (Photographer). (2015). *Vast Parking Lot Limits Restoration* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.47

DeVault, J. (Photographer). (2015). *Unprogrammed Space Limits Creek Access* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.48

DeVault, J. (Photographer). (2015). *Intersection Creates Chaotic Experience* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.49

DeVault, J. (Photographer). (2015). *Lack Of Easy Access To Natural Amenities* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.50

DeVault, J. (Photographer). (2015). *Pedestrians Displaced to Street Edges* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.51

DeVault, J. (Photographer). (2015). *Outdoor Dining/Seating Spaces Are Limited* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.52

DeVault, J. (Photographer). (2015). *Opportunity To Create Active "Hub"* [Photograph], Retrieved March 17, 2015, from: Author's Collection

Figure 5.53

DeVault, J. (Photographer). (2015). *Library Has Trivial Contextual Relationship* [Photograph], Retrieved March 17, 2015, from: Author's Collection



Figure 5.54

DeVault, J. (Cartographer). (2015). *Building Functions and Entrances* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.55

DeVault, J. (Cartographer). (2015). *Primary Opportunities and Constraints* [Map]. from: ArcGIS & Adobe Illustrator

Figure 5.56

Kansas State University. (Owner). (2015). *Chilled Water Plan* [Campus Plan], Retrieved March 21, 2015, from: Interview With University Architect: Ryan Swanson

Figure 5.57

Kansas State University. (Owner). (2015). *Mid-Campus Drive Design Proposal* [Site Plan], Retrieved March 21, 2015, from: Interview With University Architect: Ryan Swanson

Figure 5.58

Kansas State University (Owner). (2015). *Design Details* [Drawing], Retrieved March 21, 2015, from: Interview With University Architect: Ryan Swanson

Figure 6.1

DeVault, J. (Creator). (2015). *Design Process* [Diagram]. from: Adobe Illustrator

Figure 6.2

DeVault, J. (Creator). (2015). *Conceptual Campus Wide Plan* [Diagram]. from: Adobe Illustrator, ArcGIS, and Adobe Photoshop

Figure 6.3

DeVault, J. (Creator). (2015). *Campus Scale Design* [Diagram]. from: Adobe Illustrator

Figure 6.4

DeVault, J. (Creator). (2015). *Parking Removal & Consolidation* [Diagram]. from: Adobe Illustrator and ArcGIS

Figure 6.5

DeVault, J. (Creator). (2015). *Building Infill Creates Higher Density* [Diagram]. from: Adobe Illustrator and ArcGIS

Figure 6.6

DeVault, J. (Creator). (2015). *Street Closures & Re-Alignments* [Diagram]. from: Adobe Illustrator and ArcGIS

Figure 6.7

DeVault, J. (Creator). (2015). *Proposed Bicycle Infrastructure* [Diagram]. from: Adobe Illustrator and ArcGIS

Figure 6.8

DeVault, J. (Creator). (2015). *Existing Lack of Restorative & Active Affordances* [Section View Drawing]. from: AutoCAD & Adobe Photoshop

Figure 6.9

DeVault, J. (Creator). (2015). *Proposed Separated Bicycle Lane And Riparian Corridor Improvements* [Section View Drawing]. from: AutoCAD & Adobe Photoshop

Figure 6.10

DeVault, J. (Creator). (2015). *Street Diet And Related Pedestrian Improvements* [Diagram]. from: Adobe Illustrator and ArcGIS

Figure 6.11

DeVault, J. (Creator). (2015). *Current Site Conditions At Claflin Road* [Section View Drawing]. from: AutoCAD & Adobe Photoshop

Figure 6.12

DeVault, J. (Creator). (2015). *Proposed Street Diet* [Section View Drawing]. from: AutoCAD & Adobe Photoshop

Figure 6.13

DeVault, J. (Creator). (2015). *Potential Bicycle Share Hub Locations* [Diagram]. from: Adobe Illustrator and ArcGIS

Figure 6.14

DeVault, J. (Creator). (2015). *Multi-Modal Transit System* [Diagram]. from: Adobe Illustrator and ArcGIS

Figure 6.15

DeVault, J. (Creator). (2015). *Corridor Scale Design Boundary* [Diagram]. from: Adobe Illustrator and ArcGIS

Figure 6.16

DeVault, J. (Creator). (2015). *Corridor Scale Design* [Diagram]. from: Adobe Illustrator

Figure 6.17

DeVault, J. (Creator). (2015). *Corridor Scale Design Assumptions* [Diagram]. from: AutoCAD & Adobe Illustrator

Figure 6.18

DeVault, J. (Creator). (2015). *Social Opportunity Nodes & Spatial Diversity* [Diagram]. from: AutoCAD & Adobe Illustrator

Figure 6.19

DeVault, J. (Creator). (2015). *Key Contextual & Access Relationships* [Diagram]. from: AutoCAD & Adobe Illustrator

Figure 6.20

DeVault, J. (Creator). (2015). *Corridor Building Height* [Diagram]. from: AutoCAD & Adobe Illustrator

Figure 6.21

DeVault, J. (Creator). (2015). *Emergency Access Considerations* [Diagram]. from: Adobe Illustrator

Figure 6.22

DeVault, J. (Creator). (2015). *Circulation Definition & Rationale* [Diagram]. from: AutoCAD & Adobe Illustrator

Figure 6.23

DeVault, J. (Creator). (2015). *Spatial Programming And Activities* [Diagram]. from: AutoCAD & Adobe Illustrator

Figure 6.24

DeVault, J. (Creator). (2015). *Restorative Spatial Archetypes* [Diagram]. from: Adobe Illustrator

Figure 6.25

DeVault, J. (Creator). (2015). *Application Of Restorative Spatial Archetypes* [Diagram]. from: AutoCAD & Adobe Illustrator

Figure 6.26

DeVault, J. (Creator). (2015). *Archetypal Restorative Outcome Levels* [Diagram]. from: AutoCAD & Adobe Illustrator

Figure 6.27

DeVault, J. (Creator). (2015). *Corridor Gateways And Landmarks* [Diagram]. from: AutoCAD & Adobe Illustrator

Figure 6.28

DeVault, J. (Creator). (2015). *Corridor Active Transportation Considerations* [Diagram]. from: AutoCAD & Adobe Illustrator

Figure 6.29

DeVault, J. (Creator). (2015). *Site Scale Design* [Diagram]. from: Adobe Illustrator

Figure 6.30

DeVault, J. (Creator). (2015). *Site Scale Plan* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.31

DeVault, J. (Creator). (2015). *Spatial Hierarchy* [Diagram]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.32

DeVault, J. (Creator). (2015). *Site Circulation* [Diagram]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.33

DeVault, J. (Creator). (2015). *Site Views & Experience* [Diagram]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.34

DeVault, J. (Creator). (2015). *Degrees Of Enclosure* [Diagram]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.35

DeVault, J. (Creator). (2015). *Restorative Water Features* [Diagram]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.36

DeVault, J. (Creator). (2015). *Vegetation* [Diagram]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.37

DeVault, J. (Creator). (2015). *Social Vs. Introspective Level* [Diagram]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.38

DeVault, J. (Creator). (2015). *Sensory Stimulation* [Diagram]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.39

DeVault, J. (Creator). (2015). *Site Scale Spaces* [Diagram]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.40

DeVault, J. (Creator). (2015). *Spatial Archetype 1* [Diagram]. from: Adobe Illustrator

Figure 6.41

DeVault, J. (Creator). (2015). *Key Plan 1* [Diagram]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.42

DeVault, J. (Creator). (2015). *Site Section AA* [Section View Drawing]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.43

DeVault, J. (Creator). (2015). *Illustrative Plan 1* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.44

DeVault, J. (Creator). (2015). *Garden Street Decompression/ Gateway Court* [Perspective Rendering]. from: Adobe Illustrator, SketchUp, Adobe Photoshop, and AutoCAD

Figure 6.45

DeVault, J. (Creator). (2015). *Spatial Archetype 2* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.46

DeVault, J. (Creator). (2015). *Key Plan 2* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.47

DeVault, J. (Creator). (2015). *Site Section BB* [Section View Drawing]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.48

DeVault, J. (Creator). (2015). *Illustrative Plan 2* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.49

DeVault, J. (Creator). (2015). *Spatial Archetype 3* [Diagram]. from: Adobe Illustrator

Figure 6.50

DeVault, J. (Creator). (2015). *Key Plan 3* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.51

DeVault, J. (Creator). (2015). *Site Section CC* [Section View Drawing]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.52

DeVault, J. (Creator). (2015). *Illustrative Plan 3* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.53

DeVault, J. (Creator). (2015). *Dense Grove Shapes A Serene, Contemplative Atmosphere* [Perspective Rendering]. from: Adobe Illustrator, SketchUp, Adobe Photoshop, and AutoCAD

Figure 6.54

DeVault, J. (Creator). (2015). *Spatial Archetype 4* [Diagram]. from: Adobe Illustrator

Figure 6.55

DeVault, J. (Creator). (2015). *Key Plan 4* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.56

DeVault, J. (Creator). (2015). *Site Section DD* [Section View Drawing]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.57

DeVault, J. (Creator). (2015). *Illustrative Plan 4* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.58

DeVault, J. (Creator). (2015). *Spatial Archetype 5* [Diagram]. from: Adobe Illustrator

Figure 6.59

DeVault, J. (Creator). (2015). *Key Plan 5* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.60

DeVault, J. (Creator). (2015). *Site Section EE* [Section View Drawing]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.61

DeVault, J. (Creator). (2015). *Illustrative Plan 5* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.62

DeVault, J. (Creator). (2015). *Spatial Archetype 6* [Diagram]. from: Adobe Illustrator

Figure 6.63

DeVault, J. (Creator). (2015). *Key Plan 6* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.64

DeVault, J. (Creator). (2015). *Site Section FF* [Section View Drawing]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.65

DeVault, J. (Creator). (2015). *Illustrative Plan 6* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.66

DeVault, J. (Creator). (2015). *Entry Experience Into Garden Street From Transit Stop* [Perspective Rendering]. from: Adobe Illustrator, SketchUp, Adobe Photoshop, and AutoCAD

Figure 6.67

DeVault, J. (Creator). (2015). *Spatial Archetype 7* [Diagram]. from: Adobe Illustrator

Figure 6.68

DeVault, J. (Creator). (2015). *Key Plan 7* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.69

DeVault, J. (Creator). (2015). *Site Section GG* [Section View Drawing]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.70

DeVault, J. (Creator). (2015). *Illustrative Plan 7* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.71

DeVault, J. (Creator). (2015). *Spatial Archetype 8* [Diagram]. from: Adobe Illustrator

Figure 6.72

DeVault, J. (Creator). (2015). *Key Plan 8* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.73

DeVault, J. (Creator). (2015). *Site Section HH* [Section View Drawing]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.74

DeVault, J. (Creator). (2015). *Illustrative Plan 8* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.75

DeVault, J. (Creator). (2015). *Spatial Archetype 9* [Diagram]. from: Adobe Illustrator

Figure 6.76

DeVault, J. (Creator). (2015). *Key Plan 9* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.77

DeVault, J. (Creator). (2015). *Site Section II* [Section View Drawing]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.78

DeVault, J. (Creator). (2015). *Illustrative Plan 9* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.79

DeVault, J. (Creator). (2015). *Bicyclists Ride Past Naturalized Creek And Trails* [Perspective Rendering]. from: Adobe Illustrator, SketchUp, Adobe Photoshop, and AutoCAD

Figure 6.80

DeVault, J. (Creator). (2015). *Spatial Archetype 10* [Diagram]. from: Adobe Illustrator

Figure 6.81

DeVault, J. (Creator). (2015). *Key Plan 10* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.82

DeVault, J. (Creator). (2015). *Site Section JJ* [Section View Drawing]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.83

DeVault, J. (Creator). (2015). *Illustrative Plan 10* [Site Plan]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD



Figure 6.84

DeVault, J. (Creator). (2015). *Outdoor Recreation Space Sheltered By Landform* [Perspective Rendering]. from: Adobe Illustrator, SketchUp, Adobe Photoshop, and AutoCAD

Figure 6.85

DeVault, J. (Creator). (2015). *Spatial Character Along The Mid-Campus Garden Street* [Diagram]. from: Adobe Illustrator, Adobe Photoshop, and AutoCAD

Figure 6.86

DeVault, J. (Creator). (2015). *Mental & Physical Health Promotion* [Diagram]. from: Adobe Illustrator

Figure 7.1

DeVault, J. (Creator). (2015). *Active Restoration* [Diagram]. from: Adobe Illustrator

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## Table 2.1

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## Table 2.2

DeVault, J. (Creator). (2015). *Campus Street Closure Case Study Program Elements And Design Considerations* [Table]. from: Adobe Illustrator

## Table 2.3

DeVault, J. (Creator). (2015). *Themes Related To Specific Program Elements & Design Considerations* [Table]. from: Adobe Illustrator

## Table 2.4

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## Table 2.5

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## Table 2.6

DeVault, J. (Creator). (2015). *Restorative Case Study Program Elements And Design Considerations* [Table]. from: Adobe Illustrator



08



## **APPENDICES**

The appendices of this report provide supplemental project information and findings not necessarily relevant to the main body of the report.

# APPENDIX A: SURVEY QUESTIONS

Default Question Block

**Q1.** Hello, my name is Ross DeVault, and I am a current graduate student studying Landscape Architecture at Kansas State University. On behalf of myself and those involved with this campus design related research, I'd like to thank you for your participation in this brief survey. Anticipated benefits include a greater understanding of student's needs, health, and habits. This research will be pivotal to inform future design decisions within the campus within my Master's Project and Report. This survey should last no longer than 5-10 minutes and will make you eligible for a \$25 gift card to a store of your choice upon providing your email address. Your identity and email address will not be in any way shared with any other parties, and will be used only to identify a gift card winner. All survey results will remain completely anonymous and will not involve any risks on your behalf. Upon completion of the survey, there will be no further consequences or challenges anticipated for any subjects.

Your participation is entirely voluntary and can be terminated at any time without penalty. Thank you once again, and please answer the following questions as honestly as possible. If you would like to request more information about the survey or research process please don't hesitate to contact me at [rdevault@ksu.edu](mailto:rdevault@ksu.edu)

☐ I understand and wish to proceed

**Q2.** What is your current status as a Student at Kansas State University?

- ☐ Undergraduate Student
- ☐ Graduate Student
- ☐ Non-Traditional Student

**Q3.** What is your gender?

- ☐ Male
- ☐ Female

**Q4.** Rate your typical stress and anxiety levels during the school term (0 being not stressed out or anxious and 10 being extremely stressed out or anxious)

	No Stress				Some Stress				Extremely Stressed Out		
	0	1	2	3	4	5	6	7	8	9	10
Stress and Anxiety											

**Q5.** Rate your typical weekly physical activity (e.g., walking, bicycling, jogging, exercising) (0 being not active and 10 being extremely active)

	Not Active				Somewhat Active				Extremely Active		
	0	1	2	3	4	5	6	7	8	9	10
Physical Activity											

**Q6.** Would you take advantage of outdoor recreation and workout equipment placed within Kansas State University's core campus?

- ☐ Yes
- ☐ No

**Q7.** Do you own or have access to your own personal vehicle during the school term? (eg., car, truck, motorcycle)

- ☐ Yes
- ☐ No

**Q8.** How often do you use your personal vehicle to commute to campus?

- ☐ Never
- ☐ Less than Once a Month
- ☐ Once a Month
- ☐ 2-3 Times a Month
- ☐ Once a Week
- ☐ 2-3 Times a Week
- ☐ Daily

**Q9. Rank the streets listed below in terms of how often you use them to cut through campus in order to arrive at a destination outside the campus limits. (Drag to change ranking)**

• Claflin Road	1
• 17th Street	2
• Mid Campus Drive	3

**Q10. Do you bicycle to campus or class?**

- ☐ Yes, it is my main mode of transit
- ☐ Yes, I will often
- ☐ Yes, but only occasionally
- ☐ No

**Q11. How much more likely would you be to ride (take) a bicycle to campus and class if separated bicycle lanes were added within the campus?**

- ☐ Very Unlikely
- ☐ Unlikely
- ☐ Neither Unlikely Nor Likely
- ☐ Likely
- ☐ Very Likely

**Q12. How much more likely would you be to bicycle to campus and class if there were more support infrastructure for bicycling (more bicycle racks, bike sharing systems, tool and workstations)**

- ☐ Very Unlikely
- ☐ Unlikely
- ☐ Neither Unlikely Nor Likely
- ☐ Likely
- ☐ Very Likely

**Q13. Select any of the following items which would increase the likelihood of choosing to bicycle to campus rather than driving a personal vehicle**

- ☐ Separated campus wide bicycle lanes
- ☐ "Clean Air Cash" paying individuals who choose not to drive to campus up to \$300 dollars per year
- ☐ Increased bicycle signage on campus
- ☐ Showers and lockers in more buildings on campus
- ☐ A bicycle sharing program allowing low cost bicycle rentals
- ☐ Easily accessible campus bicycle route maps
- ☐ Subsidized on campus bicycle repair/parts shop
- ☐ Bicycle valet parking service on campus
- ☐ Covered bicycle parking
- ☐ Bicycle parking closer to my final destination
- ☐ Organized group bicycle rides from campus to local recreation trails
- ☐ Bicycle education courses
- ☐

"Bicycle week" to increase awareness and appreciation of bicycling to campus

☐ Other (please describe anything else that would make you more likely to bicycle to campus)

**Q14. How often do you feel anxious or stressed out when bicycling through the university campus?**

- ☐ Daily
- ☐ 2-3 Times a Week
- ☐ Once a Week
- ☐ 2-3 Times a Month
- ☐ Once a Month
- ☐ Less than Once a Month
- ☐ Never

**Q15. What factors contribute most to your stress or anxiety when bicycling through campus? (Select up to 5)**

- ☐ Conflicts with vehicles
- ☐ Conflicts with pedestrians on streets
- ☐ Lack of bicycle lanes
- ☐ Lack of bicycle parking facilities
- ☐ Lack of signage related to bicycles
- ☐ Unclear understanding of "right of way"
- ☐ Lack of lighting during the evening and night hours
- ☐ Lack of visual stimulation
- ☐ Other (Please specify)

**Q16. How stressful would you describe the experience of bicycling through campus due to conflicts with vehicles and pedestrians?**



**Q17. How often do you feel legitimately concerned about being struck by a vehicle or colliding with a pedestrian when bicycling on campus?**

- ☐ Daily
- ☐ 2-3 Times a Week
- ☐ Once a Week
- ☐ 2-3 Times a Month
- ☐ Once a Month
- ☐ Less than Once a Month
- ☐ Never

**Q18. How stressful would you describe the experience of walking through campus due to conflicts with vehicles and bicyclists?**



**Q19. How often do you feel legitimately concerned about being struck by a vehicle or bicycle when walking on campus?**



- ☐ Daily
- ☐ 2-3 Times a Week
- ☐ Once a Week
- ☐ 2-3 Times a Month
- ☐ Once a Month
- ☐ Less than Once a Month
- ☐ Never

**Q20. How much more likely would you be to participate in more daily physical activity if separated bicycle routes and more natural paths were added to Kansas State's campus?**

- ☐ Very Unlikely
- ☐ Unlikely
- ☐ Neither Unlikely Nor Likely
- ☐ Likely
- ☐ Very Likely

**Q21. How much more likely would you be to walk to campus and class if vehicular roads within the campus core were closed and replaced with aesthetically pleasing pedestrian focused walkways?**

- ☐ Very Unlikely
- ☐ Unlikely
- ☐ Neither Unlikely Nor Likely
- ☐ Likely
- ☐ Very Likely

**Q22. How often do you feel anxious or stressed out when crossing vehicular streets or walking through the university campus?**

- ☐ Daily
- ☐ 2-3 Times a Week
- ☐ Once a Week
- ☐ 2-3 Times a Month
- ☐ Once a Month
- ☐ Less than Once a Month
- ☐ Never

**Q23. What factors contribute most to your stress or anxiety when walking through campus? (Select up to 5)**

- ☐ Conflicts with vehicles
- ☐ Conflicts with bicycles on sidewalks
- ☐ Overcrowded sidewalks
- ☐ Lack of landscaped elements
- ☐ Lack of personal space
- ☐ Lack of directional signage
- ☐ Lack of lighting during the evening and night hours
- ☐ Lack of visual stimulation
- ☐ Other (Please specify)

**Q24. Walking and crossing on sidewalks alongside vehicular streets on campus stresses me out more than walking on sidewalks next to open, natural spaces.**

- ☐ True
- ☐ False

**Q25. I would be more likely to spend time in a quiet, calm, and peaceful space on campus than one near a vehicular street with**

**traffic.**

- ☐ True
- ☐ False

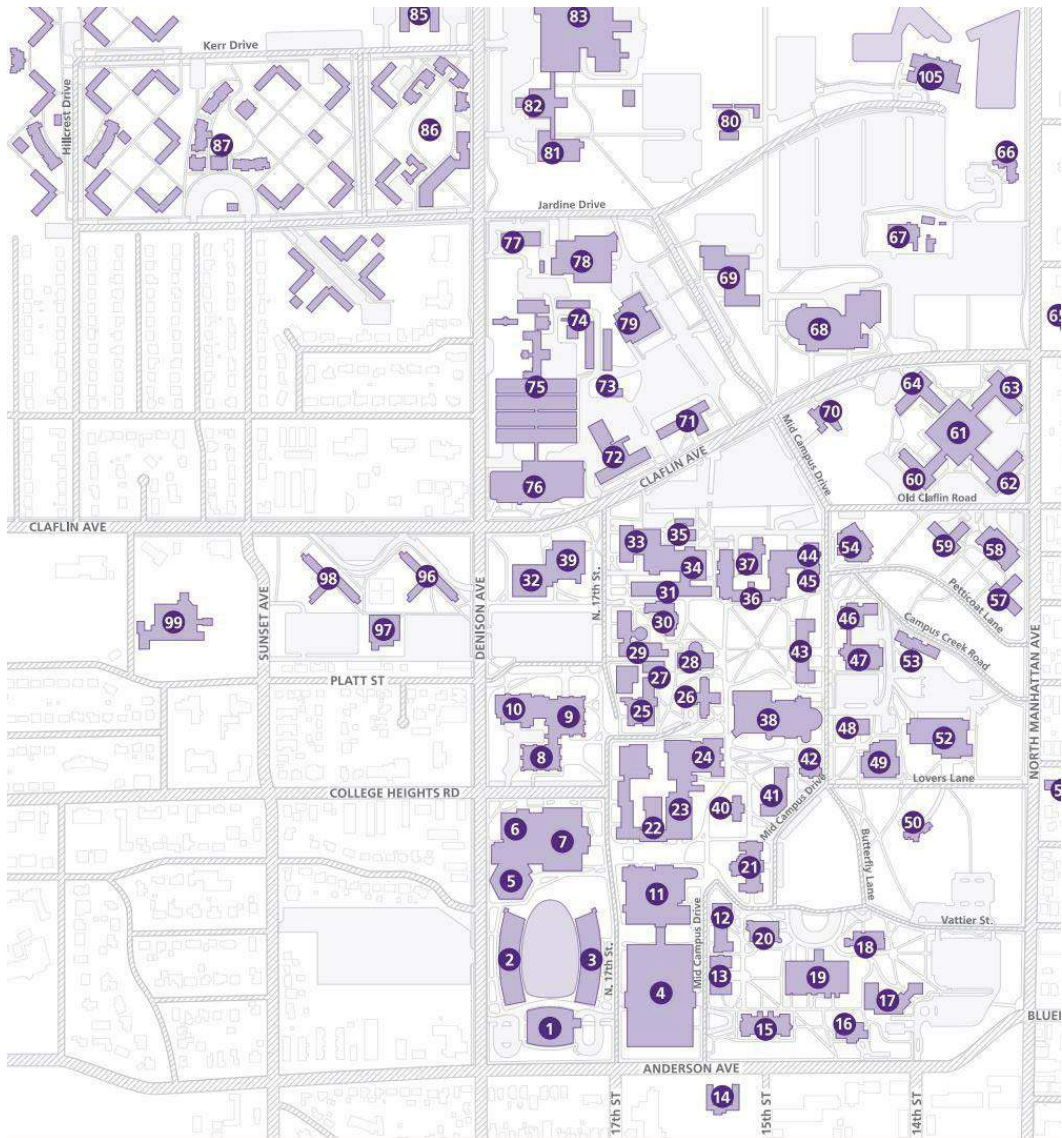
**Q26. Where outdoors on campus do you feel the most mentally restored or at peace? (Select up to 2)**

- ☐ The more open green, natural designed spaces (quads, fields, groves)
- ☐ The more intimate green natural designed spaces (gardens, courtyards)
- ☐ Alongside streets with vehicular traffic
- ☐ Plazas or other paved gathering spaces
- ☐ The parking lots

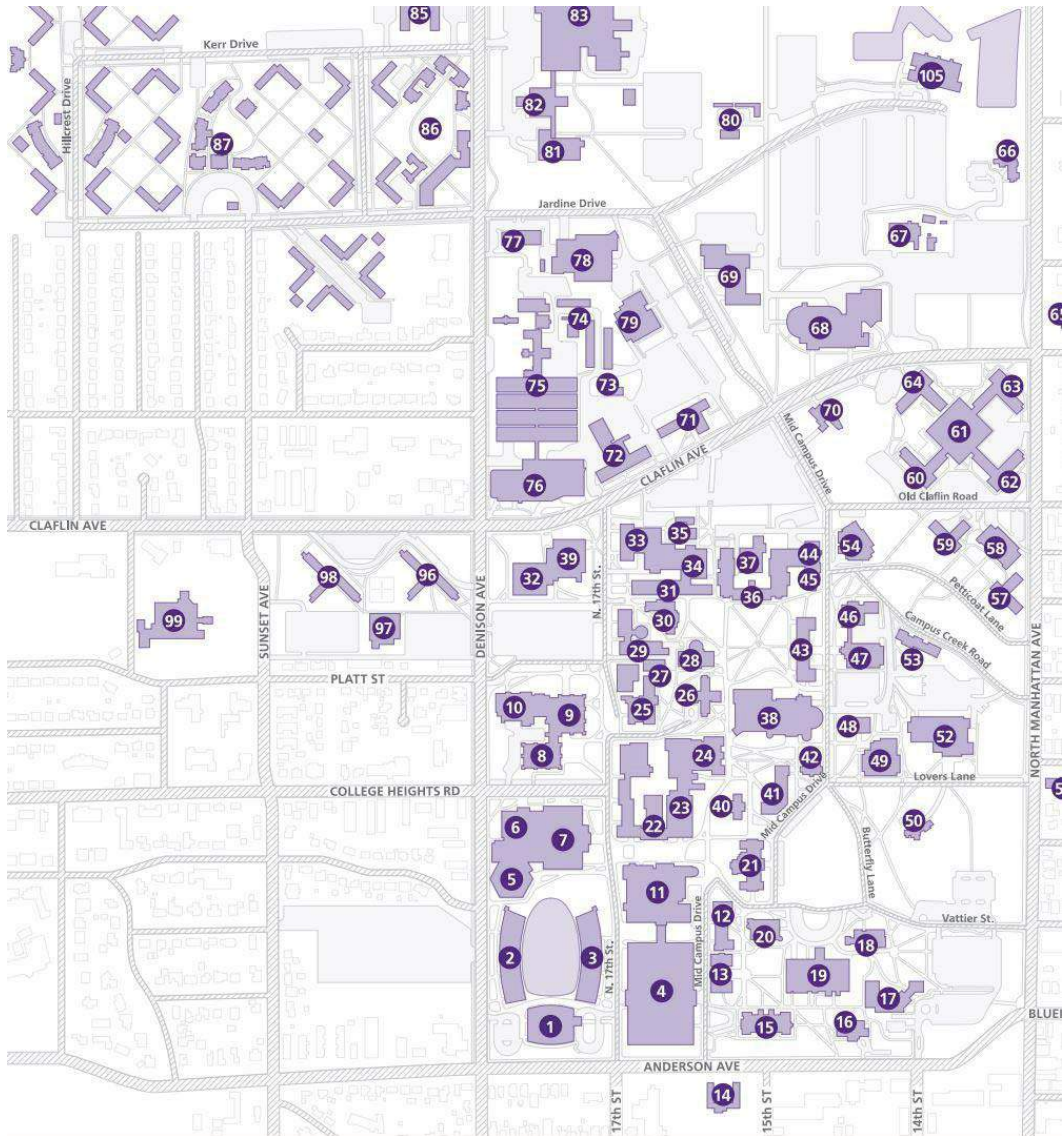
**Q27. Where on campus do you feel the most stressed out or anxious? (Select up to 2)**

- ☐ The more open green, natural designed spaces (quads, fields, groves)
- ☐ The more intimate green natural designed spaces (gardens, courtyards)
- ☐ Alongside the streets with vehicular traffic
- ☐ Plazas or other paved gathering spaces
- ☐ The parking lots

**Q28. Please click on the five (5) buildings or spaces on campus that you've traveled to most often in your time at Kansas State.**



Q29. Please click on three (3) outdoor environments (eg., streets, quads, parking lots, paths, plazas) within the Kansas State University campus that stress you out or make you anxious as a pedestrian or bicyclist.



**Q30. How often do you currently use the outdoor campus environment for any activity besides commuting to and from class or other school related commitments? (eg., studying, jogging, relaxing, walking, Frisbee, having lunch)**

- ☐ Never
- ☐ Less than Once a Month
- ☐ Once a Month
- ☐ 2-3 Times a Month
- ☐ Once a Week
- ☐ 2-3 Times a Week
- ☐ Daily

**Q31. I would be more likely to spend time outdoors on campus if... (choose as many as you agree with)**

- ☐ There were less cars cutting through campus



- ☐ There were more natural landscaped places to sit alone or gather within
- ☐ There were more places to sit or gather with friends
- ☐ The campus landscape had more variety
- ☐ There was more protection from the elements
- ☐ There were smaller, more intimate spaces to spend time within
- ☐ There were more outdoor spaces for studying and working
- ☐ Other(s) (Please list)
- ☐ None of the above would affect how much time I spent outside on campus

**Q32. How important was the aesthetic value and character of the campus in your decision to attend Kansas State University?**

- ☐ Not at all Important
- ☐ Very Unimportant
- ☐ Neither Important nor Unimportant
- ☐ Very Important
- ☐ Extremely Important

**Q33. What percentage of the Kansas State University campus, in your estimation, is dedicated to the movement and parking of vehicles?**

- ☐ 0-20%
- ☐ 21-40%
- ☐ 41-60%
- ☐ 61-80%
- ☐ 81-100%

**Q34. What is your email address? (Optional)**

**(Will be used in order to make contact with a raffle winner at conclusion of data collection. Your information will not be shared with any other parties under any circumstances)**

# APPENDIX B: SURVEY RESPONSES

## My Report

Last Modified: 03/01/2015

1. Hello, my name is Ross DeVault, and I am a current graduate student studying Landscape Architecture at Kansas State University. On behalf of myself and those involved with this campus design related research, I'd like to thank you for your participation in this brief survey. Anticipated benefits include a greater understanding of student's needs, health, and habits. This research will be pivotal to inform future design decisions within the campus within my Master's Project and Report. This survey should last no longer than 5-10 minutes and will make you eligible for a \$25 gift card to a store of your choice upon providing your email address. Your identity and email address will not be in any way shared with any other parties, and will be used only to identify a gift card winner. All survey results will remain completely anonymous and will not involve any risks on your behalf. Upon completion of the survey, there will be no further consequences or challenges anticipated for any subjects. Your participation is entirely voluntary and can be terminated at any time without penalty. Thank you once again, and please answer the following questions as honestly as possible. If you would like to request more information about the survey or research process please don't hesitate to contact me at [rdevault@ksu.edu](mailto:rdevault@ksu.edu)

#	Answer	Bar	Response	%
4	I understand and wish to proceed		174	100%
	Total		174	



Statistic	Value
Min Value	4
Max Value	4
Mean	4.00
Variance	0.00
Standard Deviation	0.00
Total Responses	174

2. What is your current status as a Student at Kansas State University?

#	Answer	Bar	Response	%
1	Undergraduate Student		97	54%
2	Graduate Student		80	44%
3	Non-Traditional Student		3	2%
	Total		180	

Statistic	Value
Min Value	1
Max Value	3
Mean	1.48
Variance	0.28
Standard Deviation	0.53
Total Responses	180

3. What is your gender?

#	Answer	Bar	Response	%
1	Male		76	42%
2	Female		104	58%
	Total		180	

Statistic	Value
Min Value	1
Max Value	2
Mean	1.58
Variance	0.25
Standard Deviation	0.50
Total Responses	180



4. Rate your typical stress and anxiety levels during the school term (0 being not stressed out or anxious and 10 being extremely stressed out or anxious)

#	Answer	Min Value	Max Value	Average Value	Standard Deviation	Responses
1	Stress and Anxiety	1.00	10.00	6.93	1.73	180

5. Rate your typical weekly physical activity (e.g., walking, bicycling, jogging, exercising) (0 being not active and 10 being extremely active)

#	Answer	Min Value	Max Value	Average Value	Standard Deviation	Responses
1	Physical Activity	1.00	10.00	5.23	2.38	178

6. Would you take advantage of outdoor recreation and workout equipment placed within Kansas State University's core campus?

#	Answer	Bar	Response	%
1	Yes		138	77%
2	No		41	23%
	Total		179	

Statistic	Value
Min Value	1
Max Value	2
Mean	1.23
Variance	0.18
Standard Deviation	0.42
Total Responses	179

7. Do you own or have access to your own personal vehicle during the school term? (eg., car, truck, motorcycle)

#	Answer	Bar	Response	%
1	Yes	<div></div>	159	88%
2	No	<div></div>	21	12%
	Total		180	

Statistic	Value
Min Value	1
Max Value	2
Mean	1.12
Variance	0.10
Standard Deviation	0.32
Total Responses	180

8. How often do you use your personal vehicle to commute to campus?

#	Answer	Bar	Response	%
9	Never	<div></div>	28	18%
10	Less than Once a Month	<div></div>	9	6%
11	Once a Month	<div></div>	1	1%
12	2-3 Times a Month	<div></div>	12	8%
13	Once a Week	<div></div>	17	11%
14	2-3 Times a Week	<div></div>	34	22%
15	Daily	<div></div>	57	36%
	Total		158	

Statistic	Value
Min Value	9
Max Value	15
Mean	12.97
Variance	5.14
Standard Deviation	2.27
Total Responses	158





9. Rank the streets listed below in terms of how often you use them to cut through campus in order to arrive at a destination outside the campus limits. (Drag to change ranking)

#	Answer	1	2	3	Total Responses
1	Claflin Road	47	49	31	127
2	17th Street	57	40	30	127
3	Mid Campus Drive	23	38	66	127
	Total	127	127	127	-

Statistic	Claflin Road	17th Street	Mid Campus Drive
Min Value	1	1	1
Max Value	3	3	3
Mean	1.87	1.79	2.34
Variance	0.60	0.64	0.59
Standard Deviation	0.78	0.80	0.77
Total Responses	127	127	127








10. Do you bicycle to campus or class?

#	Answer	Bar	Response	%
1	Yes, it is my main mode of transit		25	14%
2	Yes, I will often		24	13%
3	Yes, but only occasionally		36	20%
4	No		94	53%
	Total		179	






Statistic	Value
Min Value	1
Max Value	4
Mean	3.11
Variance	1.21
Standard Deviation	1.10
Total Responses	179

11. How much more likely would you be to ride (take) a bicycle to campus and class if separated bicycle lanes were added within the campus?

#	Answer	Bar	Response	%
18	Very Unlikely		16	9%
19	Unlikely		12	7%
20	Neither Unlikely Nor Likely		34	19%
21	Likely		52	29%
22	Very Likely		65	36%
	Total		179	

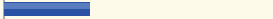













Statistic	Value
Min Value	18
Max Value	22
Mean	20.77
Variance	1.58
Standard Deviation	1.26
Total Responses	179

12. How much more likely would you be to bicycle to campus and class if there were more support infrastructure for bicycling (more bicycle racks, bike sharing systems, tool and workstations)

#	Answer	Bar	Response	%
28	Very Unlikely		12	7%
29	Unlikely		17	9%
30	Neither Unlikely Nor Likely		29	16%
31	Likely		59	33%
32	Very Likely		62	35%
	Total		179	

Statistic	Value
Min Value	28
Max Value	32
Mean	30.79
Variance	1.46
Standard Deviation	1.21
Total Responses	179

13. Select any of the following items which would increase the likelihood of choosing to bicycle to campus rather than driving a personal vehicle

#	Answer	Bar	Response	%
1	Increased bicycle signage on campus		56	32%
2	Showers and lockers in more buildings on campus		44	25%
3	A bicycle sharing program allowing low cost bicycle rentals		59	33%
4	Easily accessible campus bicycle route maps		64	36%
5	Subsidized on campus bicycle repair/parts shop		71	40%
6	Covered bicycle parking		105	59%
7	Bicycle parking closer to my final destination		89	50%
8	Bicycle education courses		28	16%
9	Separated campus wide bicycle lanes		118	67%
10	"Bicycle week" to increase awareness and appreciation of bicycling to campus		58	33%
11	"Clean Air Cash" paying individuals who choose not to drive to campus up to \$300 dollars per year		146	82%
12	Bicycle valet parking service on campus		36	20%
13	Other (please describe anything else that would make you more likely to bicycle to campus)		24	14%
14	Organized group bicycle rides from campus to local recreation trails		29	16%

**Other (please describe anything else that would make you more likely to bicycle to campus)**

Bicycle safety/security. My bike was stolen even though it was locked good.

living closer to campus

Not only bicycle racks closer to my final destination, but also closer to the edges of campus--oftentimes I'll park my bike at a nearby apartment rack because let's face it, sometimes it's just too hot and I'm just too lazy to want to bike up the killer hills leading to campus. Arriving all sweaty and embarrassed from the people watching me struggle up the hills with my twig legs is not my sense of an ideal morning. Not all of us are super-fit bike gods!

Less hills to get to campus.... you can effect that right :)

more of the simple repair stations with tire pumps and tools like in front of the union

More bike paths in Manhattan

Not additional; but covered parking would be PHENOMENAL

Linking ATA bus services to bicycle infrastructure may be something to consider.

Cute girls on bikes

I've gotten hit by a bike on campus, so having safety regulations possibly

warmer weather

bicycle safety parking

Better lanes getting TO campus... feels safer riding on the sidewalks.

"Uninterrupted" bike paths. Part of the problem with biking on campus is the stop-and-go traffic, which can be a pain on a bike.

If I lived closer to campus

Safer intersections located between campus and home (i.e. Anderson and 17th).

Creating a bike "culture" --- imagine Ciclovía in Bogotá, Colombia.

The streets outside campus, being more safe for biking

bike repair workshops

Bike routes from my home to campus.

More room for securing bikes, especially in front of student union

Owning a bicycle is the only thing that would make me more likely to bicycle to campus.

Having money for a bike :(

An indoor bike parking/storing station ocated close to the center of campus

Statistic	Value
Min Value	1
Max Value	14
Total Responses	177

14. How often do you feel anxious or stressed out when bicycling through the university campus?

#	Answer	Bar	Response	%
12	Daily	<div></div>	14	17%
13	2-3 Times a Week	<div></div>	15	18%
14	Once a Week	<div></div>	16	19%
15	2-3 Times a Month	<div></div>	14	17%
16	Once a Month	<div></div>	9	11%
17	Less than Once a Month	<div></div>	8	10%
18	Never	<div></div>	8	10%
	Total		84	

Statistic	Value
Min Value	12
Max Value	18
Mean	14.54
Variance	3.58
Standard Deviation	1.89
Total Responses	84

15. What factors contribute most to your stress or anxiety when bicycling through campus? (Select up to 5)

#	Answer	Bar	Response	%
1	Conflicts with vehicles		0	0%
2	Conflicts with pedestrians on streets		0	0%
3	Lack of bicycle lanes		0	0%
4	Lack of bicycle parking facilities		0	0%
5	Lack of signage related to bicycles		0	0%
6	Unclear understanding of "right of way"		0	0%
7	Lack of lighting during the evening and night hours		0	0%
8	Lack of visual stimulation		0	0%
9	Other (Please specify)		0	0%

Other (Please specify)	
Statistic	Value
Min Value	-
Max Value	-
Total Responses	0

16. How stressful would you describe the experience of bicycling through campus due to conflicts with vehicles and pedestrians?

#	Answer	Min Value	Max Value	Average Value	Standard Deviation	Responses
1	Stress Level	0.00	10.00	5.64	2.34	84

17. How often do you feel legitimately concerned about being struck by a vehicle or colliding with a pedestrian when bicycling on campus?

#	Answer	Bar	Response	%
1	Daily	<div></div>	13	15%
2	2-3 Times a Week	<div></div>	16	19%
3	Once a Week	<div></div>	13	15%
4	2-3 Times a Month	<div></div>	14	16%
11	Once a Month	<div></div>	17	20%
12	Less than Once a Month	<div></div>	9	11%
13	Never	<div></div>	3	4%
	Total		85	

Statistic	Value
Min Value	1
Max Value	13
Mean	5.58
Variance	19.46
Standard Deviation	4.41
Total Responses	85

18. How stressful would you describe the experience of walking through campus due to conflicts with vehicles and bicyclists?

#	Answer	Min Value	Max Value	Average Value	Standard Deviation	Responses
1	Stress Level	0.00	10.00	3.86	2.31	169

19. How often do you feel legitimately concerned about being struck by a vehicle or bicycle when walking on campus?

#	Answer	Bar	Response	%
1	Daily	<div></div>	20	11%
2	2-3 Times a Week	<div></div>	23	13%
3	Once a Week	<div></div>	24	13%
4	2-3 Times a Month	<div></div>	18	10%
5	Once a Month	<div></div>	33	19%
6	Less than Once a Month	<div></div>	41	23%
7	Never	<div></div>	19	11%
	Total		178	

Statistic	Value
Min Value	1
Max Value	7
Mean	4.24
Variance	3.70
Standard Deviation	1.92
Total Responses	178



20. How much more likely would you be to participate in more daily physical activity if separated bicycle routes and more natural paths were added to Kansas State's campus?

#	Answer	Bar	Response	%
29	Very Unlikely	<div></div>	6	3%
30	Unlikely	<div></div>	3	2%
31	Neither Unlikely Nor Likely	<div></div>	28	16%
32	Likely	<div></div>	92	52%
33	Very Likely	<div></div>	48	27%
	Total		177	

Statistic	Value
Min Value	29
Max Value	33
Mean	31.98
Variance	0.81
Standard Deviation	0.90
Total Responses	177

21. How much more likely would you be to walk to campus and class if vehicular roads within the campus core were closed and replaced with aesthetically pleasing pedestrian focused walkways?

#	Answer	Bar	Response	%
13	Very Unlikely	<div></div>	6	3%
14	Unlikely	<div></div>	10	6%
15	Neither Unlikely Nor Likely	<div></div>	40	22%
16	Likely	<div></div>	58	33%
17	Very Likely	<div></div>	64	36%
	Total		178	

Statistic	Value
Min Value	13
Max Value	17
Mean	15.92
Variance	1.11
Standard Deviation	1.05
Total Responses	178

22. How often do you feel anxious or stressed out when crossing vehicular streets or walking through the university campus?

#	Answer	Bar	Response	%
17	Daily	<div></div>	27	15%
18	2-3 Times a Week	<div></div>	27	15%
19	Once a Week	<div></div>	27	15%
20	2-3 Times a Month	<div></div>	20	11%
21	Once a Month	<div></div>	27	15%
22	Less than Once a Month	<div></div>	33	19%
23	Never	<div></div>	25	14%

Statistic	Value
Min Value	17
Max Value	23
Total Responses	178

23. What factors contribute most to your stress or anxiety when walking through campus? (Select up to 5)

#	Answer	Bar	Response	%
1	Conflicts with vehicles		0	0%
2	Conflicts with bicycles on sidewalks		0	0%
3	Overcrowded sidewalks		0	0%
4	Lack of landscaped elements		0	0%
5	Lack of personal space		0	0%
6	Lack of directional signage		0	0%
7	Lack of lighting during the evening and night hours		0	0%
8	Lack of visual stimulation		0	0%
9	Other (Please specify)		0	0%

Other (Please specify)	
Statistic	Value
Min Value	-
Max Value	-
Total Responses	0

24. Walking and crossing on sidewalks alongside vehicular streets on campus stresses me out more than walking on sidewalks next to open, natural spaces.

#	Answer	Bar	Response	%
1	True	<div></div>	136	79%
2	False	<div></div>	37	21%
	Total		173	

Statistic	Value
Min Value	1
Max Value	2
Mean	1.21
Variance	0.17
Standard Deviation	0.41
Total Responses	173

25. I would be more likely to spend time in a quiet, calm, and peaceful space on campus than one near a vehicular street with traffic.

#	Answer	Bar	Response	%
1	True		159	92%
2	False		14	8%
	Total		173	

Statistic	Value
Min Value	1
Max Value	2
Mean	1.08
Variance	0.07
Standard Deviation	0.27
Total Responses	173

26. Where outdoors on campus do you feel the most mentally restored or at peace? (Select up to 2)

#	Answer	Bar	Response	%
1	The more open green, natural designed spaces (quads, fields, groves)		124	72%
2	The more intimate green natural designed spaces (gardens, courtyards)		137	79%
3	Alongside streets with vehicular traffic		3	2%
4	Plazas or other paved gathering spaces		30	17%
5	The parking lots		1	1%

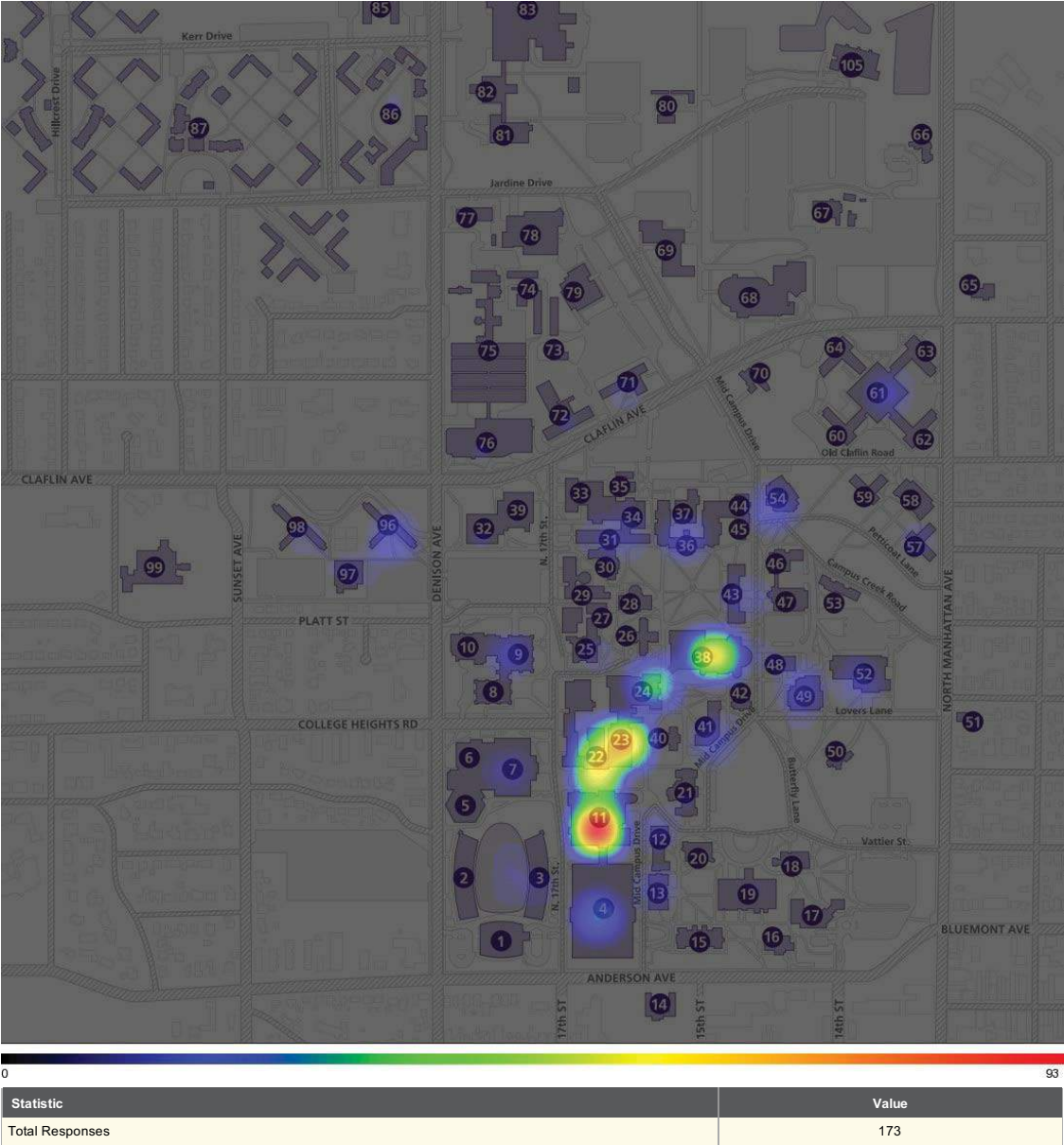
Statistic	Value
Min Value	1
Max Value	5
Total Responses	173

27. Where on campus do you feel the most stressed out or anxious? (Select up to 2)

#	Answer	Bar	Response	%
1	The more open green, natural designed spaces (quads, fields, groves)		0	0%
2	The more intimate green natural designed spaces (gardens, courtyards)		1	1%
3	Alongside the streets with vehicular traffic		122	71%
4	Plazas or other paved gathering spaces		21	12%
5	The parking lots		135	79%

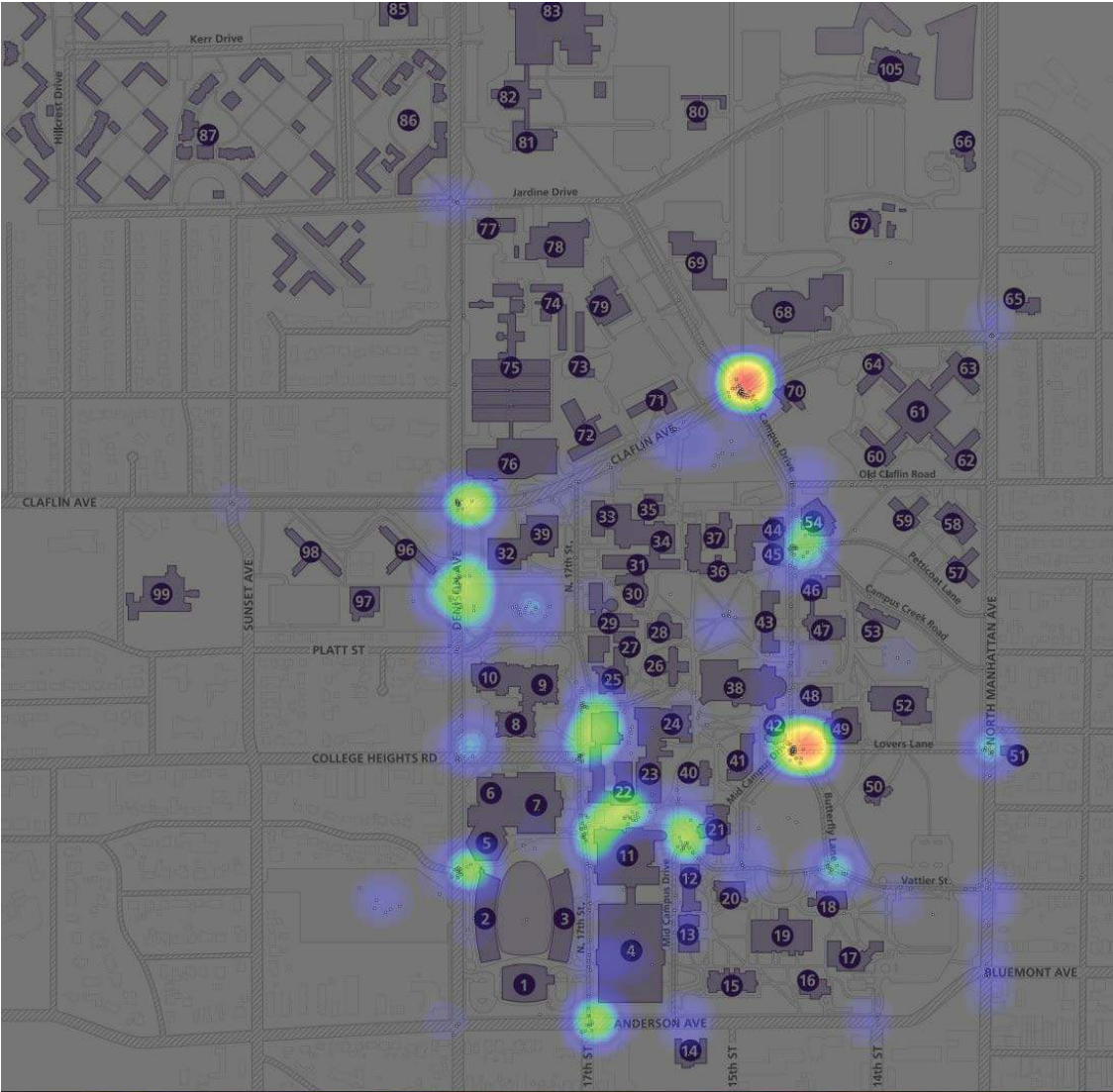
Statistic	Value
Min Value	2
Max Value	5
Total Responses	171

28. Please click on the five (5) buildings or spaces on campus that you've traveled to most often in your time at Kansas State.





29. Please click on three (3) outdoor environments (eg., streets, quads, parking lots, paths, plazas) within the Kansas State University campus that you feel stress you out or make you anxious as a pedestrian or bicyclist.



0		27	
Statistic		Value	
Total Responses		173	

30. How often do you currently use the outdoor campus environment for any activity besides commuting to and from class or other school related commitments? (eg., studying, jogging, relaxing, walking, Frisbee, having lunch)

#	Answer	Bar	Response	%
9	Never	<div></div>	24	14%
10	Less than Once a Month	<div></div>	39	23%
11	Once a Month	<div></div>	40	23%
12	2-3 Times a Month	<div></div>	26	15%
13	Once a Week	<div></div>	19	11%
14	2-3 Times a Week	<div></div>	22	13%
15	Daily	<div></div>	3	2%
	Total		173	

Statistic	Value
Min Value	9
Max Value	15
Mean	11.32
Variance	2.71
Standard Deviation	1.65
Total Responses	173

31. I would be more likely to spend time outdoors on campus if... (choose as many as you agree with)

#	Answer	Bar	Response	%
1	There were less cars cutting through campus	<div></div>	70	40%
2	There were more natural landscaped places to sit alone or gather within	<div></div>	118	68%
3	There were more places to sit or gather with friends	<div></div>	113	65%
4	The campus landscape had more variety	<div></div>	89	51%
5	There was more protection from the elements	<div></div>	107	62%
6	There were smaller, more intimate spaces to spend time within	<div></div>	87	50%
7	There were more outdoor spaces for studying and working	<div></div>	118	68%
8	Other(s) (Please list)	<div></div>	20	12%
9	None of the above would affect how much time I spent outside on campus	<div></div>	4	2%

Other(s) (Please list)
More trails on campus to run on
better seating in the plaza is ideal. benches are not comfortable and the tables around trash cans attract too many bees.
I had a less stressful major
If the weather in Kansas was no so drastic in the transition months
Running paths cutting through campus would be great
food trucks at lunch
less parking lots
the current greenspaces lack comfort and organization
I didn't have so much architecture stuff
weather was warmer for most of the year
more running trails to cut through campus on long runs, or more areas like memorial stadium to come workout or stretch
There were more places to sit. It was already an option, but I wanted to emphasize that point again.
Any ways to block the wind would be appreciated.
if the weather was good
Food is close to outdoor area
if it was warmer
I could legally open a bottle of wine on the grass!
Too busy, 7-11:30 school, 12:00am work, 7:00 go home(homework/study), 12:00 sleep repeat.
Sparatic greenhouses

Statistic	Value
Min Value	1
Max Value	9
Total Responses	173

32. How important was the aesthetic value and character of the campus in your decision to attend Kansas State University?

#	Answer	Bar	Response	%
37	Not at all Important	<div></div>	19	11%
38	Very Unimportant	<div></div>	13	8%
39	Neither Important nor Unimportant	<div></div>	47	27%
40	Very Important	<div></div>	72	42%
41	Extremely Important	<div></div>	22	13%
	Total		173	

Statistic	Value
Min Value	37
Max Value	41
Mean	39.38
Variance	1.31
Standard Deviation	1.14
Total Responses	173

33. What percentage of the Kansas State University campus, in your estimation, is dedicated to the movement and parking of vehicles?

#	Answer	Bar	Response	%
1	0-20%	<div></div>	24	14%
2	21-40%	<div></div>	74	43%
3	41-60%	<div></div>	50	29%
4	61-80%	<div></div>	22	13%
5	81-100%	<div></div>	3	2%
	Total		173	

Statistic	Value
Min Value	1
Max Value	5
Mean	2.46
Variance	0.89
Standard Deviation	0.94
Total Responses	173

# APPENDIX C: IRB EXEMPTION



University Research Compliance Office

TO: Hyung Jin Kim  
LARCP  
208 Seaton

Proposal Number: 7553

FROM: Rick Scheidt, Chair   
Committee on Research Involving Human Subjects

DATE: 02/11/2015

RE: Proposal Entitled, "Active and Restorative Campus: Redesigning University Campus Streets for Student's Mental and Physical Wellbeing"

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written - and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, 45 CFR §46.101, paragraph b, category: 2, subsection: ii.

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.



TO: Hyung Jin Kim  
LARCP  
208 Seaton

FROM: Rick Scheidt, Chair   
Committee on Research Involving Human Subjects

DATE: 04/14/2015

RE: Proposal #7553.1, entitled "Active and Restorative Campus: Redesigning University Campus Streets for Student's Mental and Physical Wellbeing."

A MINOR MODIFICATION OF PREVIOUSLY APPROVED PROPOSAL #7553,  
ENTITLED, "Active and Restorative Campus: Redesigning University Campus Streets for Student's  
Mental and Physical Wellbeing"

The Committee on Research Involving Human Subjects at Kansas State University has approved the proposal identified above as a minor modification of a previously approved proposal, and has determined that it is exempt from further review. This exemption applies only to the most recent proposal currently on file with the IRB. Any additional changes affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Unanticipated adverse events or problems involving risk to subjects or to others must be reported immediately to the IRB Chair, and / or the URCO.

It is important that your human subjects project is consistent with submissions to funding/contract entities. It is your responsibility to initiate notification procedures to any funding/contract entity of changes in your project that affects the use of human subjects.